

Glenn Suter/CI/USEPA/US

12/22/2010 11:14 AM

To Matthew Klasen

cc

bcc

Subject Re: Spruce comments

Matt, I changed one number in the response to 100a (see track changes).

(b) (5)



ATTACHMENT REDACTED - DELIBERATIVE

Potential ORD Spruce Comments.docx

Christopher
Hunter/DC/USEPA/US
12/22/2010 11:31 AM

To: Ross Geredien
cc: Julia McCarthy, Marcel Tchaou
bcc:
Subject: Re: Next set of tasks - Spruce Appendices

I'm fine with having subsections

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Ross Geredien [Chris, another quick question, this one on Sectio...](#) 12/22/2010 10:47:51 AM

From: Ross Geredien/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/22/2010 10:47 AM
Subject: Re: Next set of tasks - Spruce Appendices

Chris, another quick question, this one on Section: are we just keeping it to simple sections: A2.1., A2.2., A2.3., etc. and NOT A2.1.1. or A2.3.1.2.? Should we eliminate these latter subsections and renumber them accordingly?

Thanks.

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Christopher Hunter [I've uploaded the revised appendices on to the...](#) 12/22/2010 09:17:41 AM

From: Christopher Hunter/DC/USEPA/US
To: Marcel Tchaou/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA
Date: 12/22/2010 09:17 AM
Subject: Next set of tasks - Spruce Appendices

I've uploaded the revised appendices on to the G drive for final scrubbing. I'd like to ask each of you to take one or two and give them the final polish for consistency, formatting, and citation. Here are the rules I'd like to follow in the appendices:

- (b) (5) [REDACTED]
- [REDACTED]
- [REDACTED]

- (b) (5) [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

(b) (5) [REDACTED]

Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Matthew
Klasen/DC/USEPA/US
12/22/2010 12:02 PM

To Steven Neugeboren, Kevin Minoli, Karyn Wendelowski
cc
bcc
Subject Fw: Comment triage

Sorry -- forgot you guys on this one.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/22/2010 12:02 PM -----

From: Matthew Klasen/DC/USEPA/US
To: John Pomponio/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA
Date: 12/22/2010 12:02 PM
Subject: Comment triage

Randy, John, and Stef:

(b) (5) DPP ACP



Let me know if you have any questions.

Thanks,
Matt



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-22 Compiled H&W Comments.doc

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

**Christopher
Hunter/DC/USEPA/US**

12/22/2010 12:05 PM

To Gregory Peck, Denise Keehner, David Evans, Brian Frazer,
Steven Neugeboren, Karyn Wendelowski, Kevin Minoli

cc Matthew Klasen

bcc

Subject Bullet list of broader issues in Spruce comments

per our discussion this morning, for the 1pm



ATTACHMENT REDACTED - DELIBERATIVE

Broader Programmatic Issues Raised in Hunton.docx

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Matthew
Klasen/DC/USEPA/US
12/22/2010 12:46 PM

To Michael Slimak
cc Susan Norton
bcc
Subject Re: One add'l question for ORD assistance

Mike and Sue,

Thanks for this! We'll add this to our response.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Michael Slimak

(b) (5)

12/21/2010 02:21:06 PM

From: Michael Slimak/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Susan Norton/DC/USEPA/US@EPA
Date: 12/21/2010 02:21 PM
Subject: Re: One add'l question for ORD assistance

(b) (5)

[REDACTED]

Matthew Klasen

(b) (5)

12/21/2010 11:58:05 AM

From: Matthew Klasen/DC/USEPA/US
To: Michael Slimak/DC/USEPA/US@EPA
Cc: David Rider/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/21/2010 11:58 AM
Subject: One add'l question for ORD assistance

Hi Mike,

(b) (5) [REDACTED]

[REDACTED]

[REDACTED]

Please give me a call if you have any questions, and thanks for your help!

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher
Hunter/DC/USEPA/US
12/22/2010 12:47 PM

To Stefania Shamet
cc Margaret Passmore
bcc
Subject Re: Chris -- Can we confirm these revisions made it into the
Final Determination and into the Appendix?

These changes made it into the FD body and the appendix. Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Stefania Shamet [Hi Chris. Can you please confirm that these revi...](#) 12/22/2010 03:20:57 AM

From: Stefania Shamet/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA
Date: 12/22/2010 03:20 AM
Subject: Chris -- Can we confirm these revisions made it into the Final Determination and into the Appendix?

Hi Chris. Can you please confirm that these revisions made it in?

Maggie -- I don't believe any of the PD comments addressed this issue.

----- Forwarded by Stefania Shamet/R3/USEPA/US on 12/22/2010 03:19 AM -----

From: Margaret Passmore/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Julia
McCarthy/R8/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Regina
Poeske/R3/USEPA/US@EPA
Date: 10/20/2010 03:00 PM
Subject: Re: Fw: Spruce Coal Mine Process Technical Review by Morgan Worldwide

(b)
(5)

[REDACTED]

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3

1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Greg Pond

(b) (5)

10/14/2010 09:27:44 AM

From: Greg Pond/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA
Date: 10/14/2010 09:27 AM
Subject: Re: Fw: Spruce Coal Mine Process Technical Review by Morgan Worldwide

(b) (5)

[attachment "Spruce 1 Downstream Influence Equation Worksheet.xls" deleted by Margaret Passmore/R3/USEPA/US]

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov
Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Matthew Klasen

Greg and Maggie: Please see below for the alte...

10/13/2010 09:39:45 PM

From: Matthew Klasen/DC/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 10/13/2010 09:39 PM
Subject: Fw: Spruce Coal Mine Process Technical Review by Morgan Worldwide

(b) (5)

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 10/13/2010 09:32 PM -----

From: Christopher Hunter/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Peter Silva/DC/USEPA/US@EPA, Ann Campbell/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Jordan Dorfman/DC/USEPA/US@EPA
Date: 10/12/2010 12:30 PM
Subject: Spruce Coal Mine Process Technical Review by Morgan Worldwide

(b) (5)



[attachment "Spruce Coal Mine Process Technical Review - without maps.pdf" deleted by Greg Pond/R3/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Erin Flannery/DC/USEPA/US

12/22/2010 12:59 PM

To Stefania Shamet

cc Kevin Minoli, Matthew Klasen

bcc

Subject Re: Status of RD comments

Stef,
Here is the attachment.
Thank you, and please let me know if you have any questions.
Erin



ATTACHMENT REDACTED - DELIBERATIVE

Erin Spruce Comments 12.22.docx

Erin Flannery
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
ORISE Legal Fellow
Wetlands Division, Room 7318K, EPA West
1200 Pennsylvania Ave. NW
Mail Code: 4502T
Washington, DC 20460
Phone: (202) 566-0689
flannery.erin@epa.gov

Matthew Klasen

Thanks Erin! I'll add them into my compiled set...

12/22/2010 12:52:35 PM

From: Matthew Klasen/DC/USEPA/US
To: Erin Flannery/DC/USEPA/US@EPA
Cc: Kevin Minoli/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/22/2010 12:52 PM
Subject: Re: Status of RD comments

Thanks Erin! I'll add them into my compiled set of comments now.

I'm copying Stef and Kevin on these -- I think Stef is working through her set of comments today (with some holiday entertainment in between). Stef, because you'd originally assigned these questions yourself, please use these (as appropriate) within your compiled set.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Erin Flannery

Good morning, Matt, Attached are my draft ans...

12/22/2010 08:43:58 AM

From: Erin Flannery/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Date: 12/22/2010 08:43 AM
Subject: Re: Status of RD comments

Good morning, Matt,

Attached are my draft answers to:
80a, 94a, 95a, 96a, 105a, 107a, 108a, 109a, and 110a.

I am always open to comments. Thanks!

Erin

[attachment "Erin Spruce Comments 12.22.docx" deleted by Matthew Klasen/DC/USEPA/US]

Erin Flannery
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
ORISE Legal Fellow
Wetlands Division, Room 7318K, EPA West
1200 Pennsylvania Ave. NW
Mail Code: 4502T
Washington, DC 20460
Phone: (202) 566-0689
flannery.erin@epa.gov

Matthew Klasen

Hi everyone, Purely for "where are we now" pur...

12/22/2010 06:52:08 AM

From: Matthew Klasen/DC/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Erin Flannery/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA
Cc: John Pomponio/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/22/2010 06:52 AM
Subject: Status of RD comments

Hi everyone,

Purely for "where are we now" purposes, I thought I'd send out a summary of Spruce RD comment responses, based on the tracking spreadsheet and info I've received.

Overall, about 190 comments need responses. All are assigned to someone (based on my assessment) except about ten. 46 responses are drafted or partially drafted. The remainder await responses (or haven't been sent to me). Responses came in yesterday from Kevin, ORD, OST, and Maggie so far (recognizing that Greg Pond is probably still working on some that Maggie originally drafted).

Of the responses not yet drafted, below is a numeric breakdown of who seems to be responsible for those responses (based on the best information I have right now).

Number of Non-Drafted Comments Assigned To Each Person

Dave Kargbo 5

Dave Rider 6

Greg Pond 11

Lou Reynolds 1

Maggie Passmore 13 (note: Greg Pond may be the default to take these now if Maggie's out)

Palmer Hough 42 (working on them on flight to SEA yesterday)

Stef Shamet 48 (will be starting today)

Erin Flannery 9 (working last night / this AM)

Unknown 14 (I need to ID people for these, and some of them not need responses at all)

TOTAL 149

So, to-dos for folks on this list (if you would):

- Take a look at the attached PDF (taken directly from the tracking spreadsheet) and let me know if any of the numbered comment assignments seem wrong. The attachment lists only the responses not yet drafted, and is sorted by person's name.
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Hope this is helpful, and let me know if you have any questions. My next step is to go through the comments and pick out the "show-stopper"-looking ones as we discussed yesterday afternoon, which I'll then circulate.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229[attachment "22 am.pdf" deleted by Erin Flannery/DC/USEPA/US]

Palmer Hough/DC/USEPA/US

12/22/2010 02:46 PM

To Matthew Klasen

cc Brian Frazer, Christopher Hunter, David Kargbo, David Rider, Erin Flannery, Greg Pond, Gregory Peck, John Forren, John Pomponio, Karyn Wendelowski, Kevin Minoli, Margaret Passmore, Stefania Shamet, Tanya Code

bcc

Subject Re: Status of RD comments

Matt:

Attached is my first cut at the RD mitigation questions. I worked off of the colorful version of the questions that Stef sent back to us last weekend. The formatting is not pretty and I'm not sure how my numbers match up with your spreadsheet but the material is here. I just wanted to get these back to everyone so that we can get them plugged into the right place in the master document.

Also, for a number of these I have put comments around them with my lingering questions.

-Palmer



ATTACHMENT REDACTED - DELIBERATIVE

Hunton-Williams Comments_243-302_pfh.docx

Palmer Hough, Environmental Scientist
tel: 202.566.1374 | fax: 202.566.1375

Wetlands Division
U.S. EPA Headquarters (MC 4502T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
www.epa.gov/wetlands

Matthew Klasen

Hi everyone, Purely for "where are we now" pur...

12/22/2010 06:52:08 AM

From: Matthew Klasen/DC/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Erin Flannery/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA
Cc: John Pomponio/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/22/2010 06:52 AM
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Thanks,
Matt

Matt Klasen

U.S. Environmental Protection Agency

Office of Water (IO)

202-566-0780

cell (202) 380-7229[attachment "22 am.pdf" deleted by Palmer Hough/DC/USEPA/US]

Palmer Hough/DC/USEPA/US

12/22/2010 02:46 PM

To Matthew Klasen

cc Brian Frazer, Christopher Hunter, David Kargbo, David Rider, Erin Flannery, Greg Pond, Gregory Peck, John Forren, John Pomponio, Karyn Wendelowski, Kevin Minoli, Margaret Passmore, Stefania Shamet, Tanya Code

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Palmer Hough, Environmental Scientist
tel: 202.566.1374 | fax: 202.566.1375

Wetlands Division
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1200 Pennsylvania Avenue, NW
Washington, DC 20460
www.epa.gov/wetlands

Matthew Klasen

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12/22/2010 06:52:08 AM

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Cc: John Pomponio/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/22/2010 06:52 AM
Subject: Status of RD comments

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Thanks,
Matt

Matt Klasen

U.S. Environmental Protection Agency

Office of Water (IO)

202-566-0780

cell (202) 380-7229[attachment "22 am.pdf" deleted by Palmer Hough/DC/USEPA/US]

Christopher
Hunter/DC/USEPA/US
12/22/2010 03:36 PM

To: Julia McCarthy, Marcel Tchaou
cc
bcc
Subject: Fw: WV Selenium Criterion

(b) (5)

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/22/2010 03:35 PM -----

From: Ross Geredien/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Date: 12/22/2010 12:35 PM
Subject: WV Selenium Criterion

(b) (5)

R

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Christopher Hunter

(b) (5)

12/22/2010 11:57:35 AM

From: Christopher Hunter/DC/USEPA/US
To: Julia McCarthy/R8/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA
Cc: Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/22/2010 11:57 AM
Subject: Re: Next set of tasks - Spruce Appendices

(b) (5)

Chris Hunter
US EPA, Wetlands Protection Division
(202) 566-1454 (t)
(202) 573-6478 (c)

Julia McCarthy

----- Original Message -----

From: Julia McCarthy
Sent: 12/22/2010 11:53 AM EST
To: Ross Geredien
Cc: Christopher Hunter; Marcel Tchaou
Subject: Re: Next set of tasks - Spruce Appendices

(b) (5)

Julia McCarthy
on detail to USEPA Headquarters
Office of Wetlands, Oceans and Watersheds
(202) 566-1660
mccarthy.julia@epa.gov

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a connection of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. ~Aldo Leopold

Ross Geredien

(b) (5)

12/22/2010 11:47:10 AM

From: Ross Geredien/DC/USEPA/US
To: Julia McCarthy/R8/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/22/2010 11:47 AM
Subject: Re: Next set of tasks - Spruce Appendices

(b) (5)

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Julia McCarthy

I just spoke with Marcel and he wants us to form...

12/22/2010 10:57:15 AM

From: Julia McCarthy/R8/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA
Date: 12/22/2010 10:57 AM
Subject: Re: Next set of tasks - Spruce Appendices

I just spoke with Marcel and he wants us to format all citations the same way. The way it was decided is: for a single reference (Author Date) and for multiple (Author Date, Author Date, Author Date). This is in contrast to (Author, Date) or (Author, Date; Author, Date).

Cheers,
Julia

Julia McCarthy
on detail to USEPA Headquarters
Office of Wetlands, Oceans and Watersheds
(202) 566-1660
mccarthy.julia@epa.gov

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a connection of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. ~Aldo Leopold

Christopher Hunter

I've uploaded the revised appendices on to the...

12/22/2010 09:17:42 AM

From: Christopher Hunter/DC/USEPA/US
To: Marcel Tchaou/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA
Date: 12/22/2010 09:17 AM
Subject: Next set of tasks - Spruce Appendices

I've uploaded the revised appendices on to the G drive for final scrubbing. I'd like to ask each of you to take one or two and give them the final polish for consistency, formatting, and citation. Here are the rules I'd like to follow in the appendices:

- (b) (5) [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Julia McCarthy/R8/USEPA/US

To Christopher Hunter

12/22/2010 03:41 PM

cc

bcc

Subject Appendix 2

Hey Chris,

For some reason, it didn't work for me to save on the G drive, so here it is!



ATTACHMENT REDACTED - DELIBERATIVE

Appendix 1 macroinvertebrates 122110_jmm.doc

Happy Holidays!

Julia

Julia McCarthy
on detail to USEPA Headquarters
Office of Wetlands, Oceans and Watersheds
(202) 566-1660
mccarthy.julia@epa.gov

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a connection of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. ~Aldo Leopold

**Denise
Keehner/DC/USEPA/US**
12/22/2010 03:50 PM

To Christopher Hunter
cc David Evans
bcc
Subject A few edits on FD for Spruce



ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD 122110 draft cleandkredits.doc

Tanya Code/DC/USEPA/US
12/22/2010 04:14 PM

To Christopher Hunter
cc Palmer Hough
bcc
Subject Re: Revised Version - Spruce FD 12-21-10

Chris -

Attached are my comments on the FD. (b) (5)

Sorry I couldn't get these to you sooner or be of more help.

Please let me know if you have any questions



ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD 122110 draft clean-tc comments.doc

Tanya Code
Special Assistant
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Tel: 202.566.1063
Fax: 202.566.1147

Christopher Hunter Hello all, attached is the revised version of the S... 12/21/2010 04:20:42 PM

From: Christopher Hunter/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Steven Neugeboren/DC/USEPA/US@EPA
Cc: Julia McCarthy/R8/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/21/2010 04:20 PM
Subject: Revised Version - Spruce FD 12-21-10

Hello all,
attached is the revised version of the Spruce FD main body, including all requested revisions. We will continue to polish and work on minor inconsistencies in formatting, so please review for more conceptual and substantive issues. As I understand it, the next revised version has to go to the Pete, Nancy, and Bob tomorrow COB, so please have any comments and edits back with enough time for us to turn around a clean version. I'll be in tomorrow to discuss and answer questions if needed.

In the meantime, I will be revising appendices based on comments sent last week to prepare those for final publication, and a wide group of people (OWOW, OST, OW, R3) are working on the hundreds of responses to comments that still need to be drafted. This is by far the largest piece of the puzzle that remains to be completed.

Thanks,
Chris

[attachment "Spruce FD 122110 draft clean.doc" deleted by Tanya Code/DC/USEPA/US] [attachment "Spruce FD 122110 draft redline.doc" deleted by Tanya Code/DC/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

David Rider/R3/USEPA/US

12/22/2010 04:20 PM

To Palmer Hough

cc Matthew Klasen, John Forren

bcc

Subject Response to HW 231, 240, 242

Palmer and Matt,

Draft responses attached.

Dave

David E. Rider
US Environmental Protection Agency
1650 Arch Street (3EA50)
Philadelphia, PA 19103-2029
215-814-2787



ATTACHMENT REDACTED - DELIBERATIVE

Response 231_240_242.doc

Karyn
Wendelowski/DC/USEPA/US
12/22/2010 05:50 PM

To Christopher Hunter
cc Gregory Peck, Steven Neugeboren, Kevin Minoli,
kevin.minoli
bcc
Subject comments on draft FD



ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD kw edits 12-22-10.doc

**Christopher
Hunter/DC/USEPA/US**
12/22/2010 07:48 PM

To David Evans, Brian Frazer, Jim Pendergast
cc Julia McCarthy, Marcel Tchaou, Palmer Hough, Ross
Geredien
bcc
Subject Today's version of FD

For distribution to AA's, AO, and Region 3 - Incorporates comments from WD, OWOW, OW, OGC, R3



ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD 122210 draft.doc

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

David Evans/DC/USEPA/US

12/22/2010 10:13 PM

To Peter Silva, Nancy Stoner, Mike Shapiro

cc Bob Sussman, Steven Neugeboren, Denise Keehner, Gregory Peck, Brian Frazer, Avi Garbow, Arvin Ganesan, Christopher Hunter, Palmer Hough, Ross Geredien, Julia McCarthy, Jordan Dorfman, Ann Campbell, Matthew Klasen, Shawn Garvin, William Early, John Pomponio, Stefania Shamet, Kevin Minoli, Karyn Wendelowski

bcc

Subject Dec. 22 Working Draft of Spruce FD for Review/Comment

Pete, Nancy, Mike and all,

As everyone prepares to head out of the building, city, region or country for time off over the holidays, we wanted to share the current working draft of the Spruce FD with you all. It reflects OW/Region III staff and management review and comment, though some comments that require new research are not yet addressed. (b) (5)

Please respond with your comments to Chris Hunter by COB Wednesday, Dec. 29.

As we discussed earlier today, there will be refinements needed once work on the most recently identified Response to Comments issues is completed. We plan to circulate a final draft for your review on Dec. 30, which will incorporate these refinements, and your comments from this current draft received by Dec. 29.

Thank you, especially to staff who've done all the hard work and logged long hours to get us to this point.

Happy holidays (and happy reading) to everyone.

Dave

David Evans, Director
Wetlands Division
Office of Wetlands, Oceans and Watersheds
(202) 566-0535

-----Forwarded by David Evans/DC/USEPA/US on 12/22/2010 09:54PM -----

To: David Evans/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
From: Christopher Hunter/DC/USEPA/US
Date: 12/22/2010 07:48PM
Cc: Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA
Subject: Today's version of FD

For distribution to AA's, AO, and Region 3 - Incorporates comments from WD, OWOW, OW, OGC, R3

(See attached file: Spruce FD 122210 draft.doc)

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

ATTACHMENT REDACTED - DELIBERATIVE

hunter.christopher@epa.gov  - Spruce FD 122210 draft.doc

Bette Conway/R3/USEPA/US
12/23/2010 09:40 AM

To Amy Bergdale, Margaret Passmore, Greg Pond
cc Mark Douglas
bcc
Subject WV1021796 new Land Leasing, const on old valley fill, precip
driven discharges, selenium, it has it all...

Hello Gang, first, Happy Holidays!

Second, I am reviewing the permit (see attachments) near the deadline for comment and if you are available would request your input. I know its last minute, and I apologize for that, but we've had a few "brushfires" to put out this week and I'm the only one in so.....

(b) (5)

I've attached the draft permit and analyses, let me know if you are even in the office and willing to provide a few comments. Mark Douglas is assisting me with this one as well.
thanks,

[attachment "WV1021796 New land Leasing Patience #4 mine mod 1 draft permit.pdf" deleted by Greg Pond/R3/USEPA/US]

[attachment "WV1021796 New land Leasing Patience #4 mine mod 1 narrative & WQ data.pdf" deleted by Greg Pond/R3/USEPA/US]

Bette Conway
EPA Region III
Water Protection Division
NPDES Permits Branch
1650 Arch Street, (3WP41)
Philadelphia PA 19103
Ph: 215-814-5744
Fax: 215-814-2301
conway.bette@epa.gov

David Rider/R3/USEPA/US
12/23/2010 09:47 AM

To John Forren
cc Stefania Shamet
bcc
Subject Re: Fw: Spruce & selenium & your help

John, Stef

(b)(5) DPP ACP

[REDACTED]

Dave

Fw: Spruce & selenium & your help

Fw: Spruce & selenium & your help

John Forren to: David Rider

12/23/10 07:41 AM

Anything you could add?

John Forren
Office of Monitoring & Assessment
USEPA Philadelphia
<http://epa.gov/reg3esd1/3ea50.htm>

Sent from EPA's Wireless Services

Stefania Shamet

----- Original Message -----

From: Stefania Shamet
Sent: 12/23/2010 06:43 AM EST
To: John Forren
Cc: Frank Borsuk
Subject: Fw: Spruce & selenium & your help

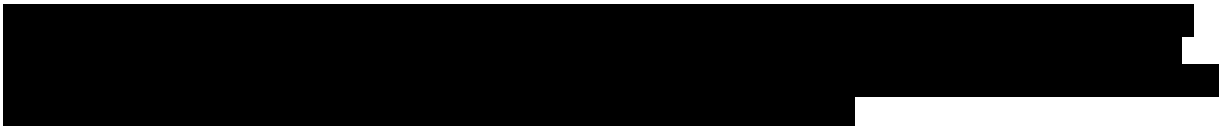
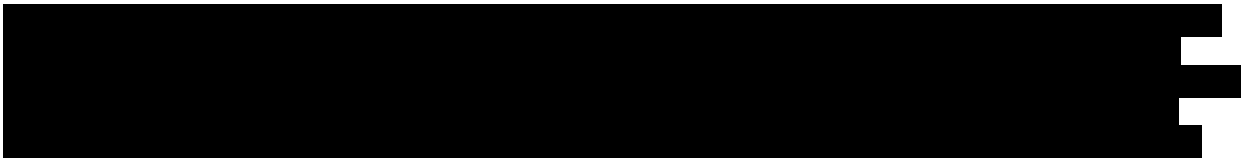
(b) (5) DPP ACP

----- Forwarded by Stefania Shamet/R3/USEPA/US on 12/23/2010 06:39 AM -----

From: Stefania Shamet/R3/USEPA/US

To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Matthew Klasen/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/23/2010 06:38 AM
Subject: Spruce & selenium & your help

(b) (5) DPP ACP



(b) (5) DPP ACP



Susan Cormier/CI/USEPA/US
12/23/2010 10:04 AM

To Rachael Novak
cc Glenn Suter, Joe Beaman
bcc
Subject Re: Fw: conductivity notes

(b) (5)

I think it is close, but we need one more edit, but here's a DRAFT in case you want to comment.

(b) (5)

PS thanks for the reprieve. My daughters are all home and I need to transform into a mom.

Best Regards, Susan

-----Rachael Novak/DC/USEPA/US wrote: -----

To: Susan Cormier/CI/USEPA/US@EPA, Glenn Suter/CI/USEPA/US@EPA
From: Rachael Novak/DC/USEPA/US
Date: 12/22/2010 05:01PM
Cc: Joe Beaman/DC/USEPA/US@EPA
Subject: Re: Fw: conductivity notes

Susan,
Excellente. Thanks for being so thorough. I'll be out next week, so if you don't get time tomorrow, no worries.
Stay warm,
Rachael

Susan Cormier---12/22/2010 04:25:26 PM---Dear Rachel, We haven't forgotten you solstice promise, but we had to work on the Spruce issue and

Fro Susan Cormier/CI/USEPA/US
m:
To: Rachael Novak/DC/USEPA/US@EPA
Cc: Glenn Suter/CI/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA
Dat 12/22/2010 04:25 PM
e:
Sub Re: Fw: conductivity notes
ject
:

Dear Rachel,

We haven't forgotten you solstice promise, but we had to work on the Spruce issue and other things.

We have a draft of the table of contents, but we want to give it one more review. This will

save us time later.
Maybe we will finish it tomorrow and send it your way.

Best regards, Susan

-----Rachael Novak/DC/USEPA/US wrote: -----

To: Susan Cormier/CI/USEPA/US@EPA, Glenn Suter/CI/USEPA/US@EPA
From: Rachael Novak/DC/USEPA/US
Date: 12/22/2010 02:16PM
Cc: Joe Beaman/DC/USEPA/US@EPA
Subject: Fw: conductivity notes

Hi Susan,
I just wanted to check on the conductivity activities' status - if you had time to line up the section headings of the CB report w/the table of contents for criteria documents I gave you at the meeting and in the 12/7 email.
Thanks and Happy Holidays!
Rachael

----- Forwarded by Rachael Novak/DC/USEPA/US on 12/22/2010 02:13 PM -----

From: Rachael Novak/DC/USEPA/US
To: Susan Cormier/CI/USEPA/US@EPA, Glenn Suter/CI/USEPA/US@EPA
Cc: Joe Beaman/DC/USEPA/US@EPA, Lisa Huff/DC/USEPA/US@EPA
Date: 12/08/2010 03:37 PM
Subject: conductivity notes

Hi Susan and Glenn,
I just wanted to pass on my notes from yesterday. Joe asked me to go over main points for an upcoming briefing, and it seems like a good idea to pass these by you and see if I understood the key issues and timeline correctly. When you have time, could you look them over and let me know? No rush.
Best,
Rachael

(See attached file: Conductivity Notes12072010.doc)

[attachment "Conductivity Notes12072010.doc" removed by Susan Cormier/CI/USEPA/US]



- Table of contents 20101223.doc

ATTACHMENT REDACTED - DELIBERATIVE

Christopher
Hunter/DC/USEPA/US

12/23/2010 10:39 AM

To Jim Pendergast

cc

bcc

Subject Re: Spruce

Matt's been taking the lead on communications. So far, all that's been developed is a draft press release that OPA is reviewing. OPA is not planning on making a big deal out of this. If I see anything else, I'll let you know.



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-19 Draft Spruce Release v.1dkedits.docx

Chris Hunter

U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Jim Pendergast

Can you copy me on all communication material...

12/23/2010 10:03:40 AM

From: Jim Pendergast/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Date: 12/23/2010 10:03 AM
Subject: Spruce

Can you copy me on all communication materials?

Jim Pendergast
Wetlands Division
202-566-0398

Christopher
Hunter/DC/USEPA/US
12/23/2010 10:40 AM

To christopher.hunter
cc
bcc
Subject Fw: Comments on Appendix 2 by Frank Borsuk - Re: Fw:
FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/23/2010 10:40 AM -----

From: Ross Geredien/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Date: 12/23/2010 10:18 AM
Subject: Re: Fw: Comments on Appendix 2 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce
404(c) Appendices 1-5

There are four that need changing. In each case, it's the number in Green. The correct number is now the file name. Sorry.



614.jpg 555.jpg 1228.jpg 961.jpg

Documents Withheld - FOIA (b)(5)

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Christopher Hunter [Hi Ross, these comments slipped through the cr...](#) 12/23/2010 09:36:32 AM

From: Christopher Hunter/DC/USEPA/US
To: Ross Geredien/DC/USEPA/US@EPA
Date: 12/23/2010 09:36 AM
Subject: Fw: Comments on Appendix 2 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce
404(c) Appendices 1-5

Hi Ross,
these comments slipped through the cracks. I thought Frank included them in his comments, but it looks to me like they were difference. Can you review and revise the WQ appendix to make sure they're incorporated?

Sorry and Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed

(202) 566-1454

hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/23/2010 09:35 AM -----

From: Margaret Passmore/R3/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/13/2010 02:23 PM
Subject: Re: Comments on Appendix 2 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Here are my comments and corrections on Appendix 2.

M

[attachment "Appendix 2 Water Quality & Wildlife 121010_MP.doc" deleted by Ross Geredien/DC/USEPA/US]

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Frank Borsuk

Chris/Palmer: (b) (5)

12/13/2010 01:42:58 PM

From: Frank Borsuk/R3/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/13/2010 01:42 PM
Subject: Re: Comments on Appendix 2 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

[attachment "Appendix 2 Water Quality & Wildlife 121010 comments by Frank Borsuk 12-13-2010.doc" deleted by Margaret Passmore/R3/USEPA/US]

Chris/Palmer:

(b) (5)

(b) (5) [Redacted]

[Redacted]

[Redacted]

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Frank Borsuk

Palmer/Chris: (b) (5)

12/13/2010 10:43:00 AM

From: Frank Borsuk/R3/USEPA/US
To: Palmer Hough/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Cc: Greg Pond/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, borsuk.frank@epa.gov
Date: 12/13/2010 10:43 AM
Subject: Comments on Appendix 4 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Palmer/Chris:

(b) (5) [Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

Frank Borsuk, Ph.D.

Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

From: Margaret Passmore/R3/USEPA/US
To: Louis Reynolds/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA
Date: 12/13/2010 06:44 AM
Subject: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Lou and Frank,

Please find the time to review your sections. Get back directly to Palmer Hough and Chris Hunter and cc me, Greg, John, and Stef.

Thanks

M

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

----- Forwarded by Margaret Passmore/R3/USEPA/US on 12/13/2010 06:39 AM -----

Fr
o Christopher Hunter/DC/USEPA/US
m
:

T Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew
o: Klasen/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael
Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina
Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Christine
Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Lavery/DC/USEPA/US@EPA, Marcus
Zobrist/DC/USEPA/US@EPA

C Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross
c: Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David
Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EP

D 12/10/2010 06:15 PM
at
e:

S FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5
u
bj
e
ct
:

Hello all,

As promised, attached for your review, please find the draft Appendices for the Spruce No. 1 Surface Mine 404(c) action. These are fairly technical, and I'm not expecting everyone to give me comments, but if you plan to review them, I am requesting **all comments (in redline/strikeout) back to me by COB December 20**. We are still finalizing the other 2 Appendices (Response to Comments and References). These will be reviewed by a smaller group within the next couple of weeks.

I will be out of the office until December 21, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thanks for your comments on the FD main text,
Chris

[attachment "Appendix 1 Macroinvertebrates 121010.doc" deleted by Frank Borsuk/R3/USEPA/US]
[attachment "Appendix 2 Water Quality & Wildlife 121010.doc" deleted by Frank Borsuk/R3/USEPA/US]
[attachment "Appendix 3 Mitigation 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment
"Appendix 4 Selenium 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment "Appendix 5
Cumulative Impacts 121010.doc" deleted by Frank Borsuk/R3/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Appendix 4 Selenium 121010 - comments by Borsuk
12-13-2010.doc" deleted by Frank Borsuk/R3/USEPA/US]

David Rider/R3/USEPA/US
12/23/2010 11:40 AM

To Carrie Traver
cc Frank Borsuk, Greg Pond, Louis Reynolds, Margaret
Passmore, Regina Poeske, Stefania Shamet
bcc
Subject Re: Golden algae and Spruce - References and data


Carrie,

Here is the Dunkard Creek - Golden Algae link 2009. Sampling information is included.

<http://www.dep.wv.gov/WWE/watershed/wqmonitoring/Pages/DunkardCreekFishKillInformation.aspx>

Dave

Re: Golden algae and Spruce - References and data

Re: Golden algae and Spruce - References and data 

Carrie Traver to: Margaret Passmore, Greg Pond, Louis Reynolds, Frank
Borsuk

12/23/10 09:28 AM

Cc: Regina Poeske, Stefania Shamet, David Rider

(b) (5)

[Redacted content]

Thanks again, and happy holidays!

Carrie

Carrie Traver

USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Louis Reynolds

Carrie, I am not sure if this Baker paper ever m...

12/22/2010 03:52:23 PM

From: Louis Reynolds/R3/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US, John Forren/R3/USEPA/US@EPA
Date: 12/22/2010 03:52 PM
Subject: Re: Golden algae and Spruce - References and data

Carrie,

I am not sure if this Baker paper ever made it to you, but please add it if its not there.

The data is for the record, you do not have it.

I also included the Rodgers paper listed by you below.

Lou

[attachment "WV-PA-Summary-qPCR results.xls" deleted by Carrie Traver/R3/USEPA/US] [attachment "Algae.xls" deleted by Carrie Traver/R3/USEPA/US] [attachment "B2009LO.pdf" deleted by Carrie Traver/R3/USEPA/US] [attachment "Bailey_P parvum summary.xls" deleted by Carrie Traver/R3/USEPA/US] [attachment "Rodgers_inpress.PDF" deleted by Carrie Traver/R3/USEPA/US]

Lou Reynolds
USEPA Region III
Freshwater Biology Team
1060 Chapline St. Ste. 303
Wheeling, WV 26003-2995
P 304-234-0244
F 304-234-0260

Carrie Traver

Lou, (b) (5)

12/20/2010 01:34:11 PM

From: Carrie Traver/R3/USEPA/US
To: Louis Reynolds/R3/USEPA/US@EPA
Date: 12/20/2010 01:34 PM
Subject: Re: Golden algae and Spruce - References

Lou,

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

Let me know if there are any other studies we should include.

Thanks!!!
Carrie

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Louis Reynolds

Not at all. (b) (5) DPP ACP

12/20/2010 01:11:47 PM

From: Louis Reynolds/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Carrie Traver/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/20/2010 01:11 PM
Subject: Golden algae and Spruce - References

Not at all.

(b) (5) DPP ACP

lou

[attachment "PparvumGrowthRate_FinalReport.pdf" deleted by Carrie Traver/R3/USEPA/US] [attachment "Reservoir symposium paper.pdf" deleted by Carrie Traver/R3/USEPA/US] [attachment "Roelke et al 2010 (JPR online).pdf" deleted by Carrie Traver/R3/USEPA/US] [attachment "B2009LO.pdf" deleted by Carrie Traver/R3/USEPA/US]

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Stefania Shamet

Hey Lou. (b) (5) DPP ACP

12/20/2010 10:38:53 AM

From: Stefania Shamet/R3/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/20/2010 10:38 AM
Subject: Re: ACK!!!!!!!!!!!! Golden algae and Spruce

Hey Lou. (b) (5) DPP ACP

Thanks. Sorry for beign a pain in the arse.

Carrie Traver

Lou, (b) (5) DPP ACP

12/20/2010 09:21:18 AM

From: Carrie Traver/R3/USEPA/US
To: Louis Reynolds/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/20/2010 09:21 AM
Subject: Re: ACK!!!!!!!!!!!! Golden algae and Spruce

Lou,

(b) (5) DPP ACP

Thanks,
Carrie

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Louis Reynolds

(b) (5) DPP ACP

12/20/2010 07:52:26 AM

From: Louis Reynolds/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Carrie Traver/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/20/2010 07:52 AM
Subject: Re: ACK!!!!!!!!!!!! Golden algae and Spruce

(b) (5) DPP ACP

[ατταχημεντ ∇ΠπαρπυμΓρωωτηΡατε_ΦιναλΡεπορτ.πδφ∇ δελετεδ βψ Χαρριε
Τραπερ/P3/ΥΣΕΠΙΑ/ΥΣ]

- Hambright 2010 was omitted from the reference list. The reference is: **Hambright, K. D. (2010) *Prymnesium parvum* Growth studies using the Dunkard Creek isolate (WANA strain).** Report submitted to: West Virginia Department of Environmental Protection Division of Water and Waste Management. Charleston, WV. Department of Zoology University of Oklahoma, Norman, OK.

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F 304-234-0260

Stefania Shamet Thanks Carrie! (b) (5) DPP ACP 12/17/2010 02:16:37 PM

From: Stefania Shamet/R3/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/17/2010 02:16 PM
Subject: Re: ACK!!!!!!!!!!!! Golden algae and Spruce

Thanks Carrie! (b) (5) DPP ACP

Thanks again and have a great weekend!

Carrie Traver Stef. (b) (5) DPP ACP 12/17/2010 02:09:36 PM

From: Carrie Traver/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/17/2010 02:09 PM
Subject: Re: ACK!!!!!!!!!!!! Golden algae and Spruce

Stef,

(b) (5) DPP ACP

[attachment "Reference additions.doc" deleted by Stefania Shamet/R3/USEPA/US]

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Stefania Shamet

(b) (5) DPP ACP

12/17/2010 01:05:03 PM

From: Stefania Shamet/R3/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/17/2010 01:05 PM
Subject: ACK!!!!!!!!!!!! Golden algae and Spruce

(b) (5) DPP ACP

Thanks.

John Forren/R3/USEPA/US
12/23/2010 12:06 PM

To: Greg Pond
cc: Margaret Passmore
bcc:
Subject: Re: Threshold Indicator Taxa Analysis (TITAN)

Wow. Okay. Thanks, Greg.

Greg Pond

(b) (5)

12/23/2010 12:04:06 PM

From: Greg Pond/R3/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA
Date: 12/23/2010 12:04 PM
Subject: Re: Threshold Indicator Taxa Analysis (TITAN)

(b) (5)

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(f) 304-234-0260
pond.greg@epa.gov
Website: <http://epa.gov/reg3esd1/3ea50.htm>

John Forren

(b) (5)

12/23/2010 11:54:50 AM

From: John Forren/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA
Date: 12/23/2010 11:54 AM
Subject: Re: Threshold Indicator Taxa Analysis (TITAN)

(b) (5)

Greg Pond

(b) (5)

12/23/2010 11:42:08 AM

From: Greg Pond/R3/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Susan Spielberger/R3/USEPA/US@EPA
Date: 12/23/2010 11:42 AM

Subject: Re: Threshold Indicator Taxa Analysis (TITAN)

(b) (5)



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Website: <http://epa.gov/reg3esd1/3ea50.htm>

John Forren

Maggie, Greg: Have you heard about this work?

12/23/2010 11:27:57 AM

From: John Forren/R3/USEPA/US
To: Margaret Passmore/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Cc: Susan Spielberger/R3/USEPA/US@EPA
Date: 12/23/2010 11:27 AM
Subject: Threshold Indicator Taxa Analysis (TITAN)

Maggie, Greg:

Have you heard about this work?

Baker ME and RS King 2009
Threshold Indicator Taxa Analysis (TITAN): a new method for detecting biodiversity and ecological community thresholds.

Bette Conway/R3/USEPA/US
12/23/2010 02:13 PM

To: Greg Pond
cc
bcc
Subject: Re: WV1021796 new Land Leasing, const on old valley fill, precip driven discharges, selenium, it has it all...

Hey Greg, Evelyn just came in the office, so we're filing an interim objection and we'll then have a little more time to look at this one..... happy holidays my friend, I'll try to NEVER pull a stunt like this again, promise! busy week, I'm the only one here, so..... happy holidays....

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NPDES Permits Branch
1650 Arch Street, (3WP41)
Philadelphia PA 19103
Ph: 215-814-5744
Fax: 215-814-2301
conway.bette@epa.gov

Greg Pond

Hi Bette, happy hoe-hoe-hoe day to you too. (b)

12/23/2010 01:31:21 PM

From: Greg Pond/R3/USEPA/US
To: Bette Conway/R3/USEPA/US@EPA
Cc: Amy Bergdale/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Mark Douglas/R3/USEPA/US@EPA
Date: 12/23/2010 01:31 PM
Subject: Re: WV1021796 new Land Leasing, const on old valley fill, precip driven discharges, selenium, it has it all...

Hi Bette, happy hoe-hoe-hoe day to you too.

(b) (5)

Im technically off today (and Maggie and Amy are out of state), but let me know if you have a particular question. (b) (5)

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Website: <http://epa.gov/reg3esd1/3ea50.htm>

Bette Conway

Hello Gang, first, Happy Holidays! Second, I am...

12/23/2010 09:40:57 AM

From: Bette Conway/R3/USEPA/US
To: Amy Bergdale/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Cc: Mark Douglas/R3/USEPA/US@EPA
Date: 12/23/2010 09:40 AM
Subject: WV1021796 new Land Leasing, const on old valley fill, precip driven discharges, selenium, it has it all...

Hello Gang, first, Happy Holidays!

Second, I am reviewing the permit (see attachments) near the deadline for comment and if you are available would request your input. I know its last minute, and I apologize for that, but we've had a few "brushfires" to put out this week and I'm the only one in so.....

(b) (5)

I've attached the draft permit and analyses, let me know if you are even in the office and willing to provide a few comments. Mark Douglas is assisting me with this one as well.
thanks,

[attachment "WV1021796 New land Leasing Patience #4 mine mod 1 draft permit.pdf" deleted by Greg Pond/R3/USEPA/US]

[attachment "WV1021796 New land Leasing Patience #4 mine mod 1 narrative & WQ data.pdf" deleted by Greg Pond/R3/USEPA/US]

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conway.bette@epa.gov

Christopher
Hunter/DC/USEPA/US
12/23/2010 03:10 PM

To Ross Geredien, Marcel Tchaou
cc
bcc
Subject Fw: Draft PPT for Pete mock hearing tomorrow on MTM (for quick review)

Sorry, I realized I cc'd you on my comments, but not the presentation itself.

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/23/2010 03:10 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/21/2010 07:25 PM
Subject: Draft PPT for Pete mock hearing tomorrow on MTM (for quick review)

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-21 Draft Pete briefing for 12-22.ppt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Greg Pond/R3/USEPA/US
12/23/2010 05:16 PM

To Matthew Klasen
cc Margaret Passmore, Stefania Shamet, John Forren
bcc
Subject Re: additions to 144

Matt, last thing from me today. Attached is more response info to 144. Hopefully this can be pasted to what you have already for #144. It doesn't go into detail on how to calculate beta diversity, but let me know if you will want the simple equation to add to this response.



ATTACHMENT REDACTED - DELIBERATIVE

144 response addition_GP.doc

Greg Pond
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(f) 304-234-0260
pond.greg@epa.gov
Website: <http://epa.gov/reg3esd1/3ea50.htm>

John Forren Great stuff, Greg. Again, thanks. Matt -- can t... 12/23/2010 12:03:28 PM

From: John Forren/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 12:03 PM
Subject: Re: additions to 146_147_151

Great stuff, Greg. Again, thanks.

Matt -- can this be weaved into the responses?

Greg Pond (b) (5) 12/23/2010 11:58:03 AM

From: Greg Pond/R3/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 11:58 AM
Subject: Re: additions to 146_147_151

(b) (5)

[REDACTED]

(b) (5)

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Website: <http://epa.gov/reg3esd1/3ea50.htm>

John Forren

Thanks, Greg. (b) (5)

12/23/2010 10:21:34 AM

From: John Forren/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 10:21 AM
Subject: Re: additions to 146_147_151

Thanks, Greg. (b) (5)

Greg Pond

Yes (b) (5)

12/23/2010 09:09:05 AM

From: Greg Pond/R3/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 09:09 AM
Subject: Re: additions to 146_147_151

Yes, (b) (5) I am heading out the door at the moment but will send more stuff around noon toady.

Greg Pond
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(f) 304-234-0260
pond.greg@epa.gov

Website: <http://epa.gov/reg3esd1/3ea50.htm>

John Forren

Great stuff, Greg! I especially like the big cross...

12/23/2010 09:04:06 AM

From: John Forren/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 09:04 AM
Subject: Re: additions to 146_147_151

Great stuff, Greg! I especially like the big crossed-out symbol across Tables 1 & 2. lol.

(b) (5) [REDACTED]

[REDACTED]

[REDACTED]

Greg Pond

Matt, first,my apologies that it looks like my sub...

12/23/2010 08:29:13 AM

From: Greg Pond/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Date: 12/23/2010 08:29 AM
Subject: additions to 146_147_151

Matt, first,my apologies that it looks like my submittal yesterday somehow re-arranged the numbering system. Ugh! Hope this doesnt take you alot of time to reconcile. I dont know how that happened but probably hitting a hard return triggered the auto number to kick in and I didnt realize it.

This attachment has additional response narrative and analysis for 3 comments. (b) (5)

[REDACTED] am still reviewing the tech. document for more information.

[attachment "GP adds for 146_147_151.doc" deleted by John Forren/R3/USEPA/US]

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Website: <http://epa.gov/reg3esd1/3ea50.htm>

David Kargbo/R3/USEPA/US
12/24/2010 12:42 PM

To: Matthew Klasen
cc: Brian Frazer, Christopher Hunter, David Rider, Erin Flannery,
Greg Pond, Gregory Peck, John Forren, John Pomponio,
Karyn Wendelowski, Kevin Minoli, Margaret Passmore,
Palmer Hough, Stefania Shamet, Tanya Code, Dave
Campbell
bcc:
Subject: Re: Status of RD comments

Matt;

The attached file contains the sections that are applicable to my original contributions.

(b) (5)
(b) (5)

Let me know if you need anything else.

Merry Christmass and Happy New Year to all



ATTACHMENT REDACTED - DELIBERATIVE

Kargbo's comments to H-W responses.docx
Re: Status of RD comments

Re: Status of RD comments 

Matthew Klasen to: Greg Pond

12/22/2010 04:48 PM

Brian Frazer, Christopher Hunter, David Kargbo, David Rider, Erin Flannery,
Cc: Gregory Peck, John Forren, John Pomponio, Karyn Wendelowski, Kevin Minoli,
Margaret Passmore, Palmer Hough, Stefania Shamet, Tanya Code

From: Matthew Klasen/DC/USEPA/US

To: Greg Pond/R3/USEPA/US@EPA

Cc: Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, David
Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Erin
Flannery/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Karyn
Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret
Passmore/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Stefania
Shamet/R3/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA

Hey Greg,

Thanks so much to you and Maggie for these! I'll compile tonight and we'll take stock of the overall responses over the next couple days. (b) (5)

Thanks again,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
Greg Pond

----- Original Message -----

From: Greg Pond

Sent: 12/22/2010 04:32 PM EST

To: Matthew Klasen

Cc: Brian Frazer; Christopher Hunter; David Kargbo; David Rider; Erin Flannery; Gregory Peck; John Forren; John Pomponio; Karyn Wendelowski; Kevin Minoli; Margaret Passmore; Palmer Hough; Stefania Shamet; Tanya Code

Subject: Re: Status of RD comments

Matt, from our call yesterday where I agreed to send along the next group of responses from Wheeling, I've drafted responses to, or edited/added information to Wheeling comments assigned to Stef or Maggie and I. My edits/additions are in blue font. Sorry about font changes, indents, etc.

The responses include 86,114,116,118,121,124-129, 131-134, 136-138, 141-147,150-154,166-167,169,178-179,187,192,204,216-217.

There are definitely some small holes to fill in with these responses, but many have as much as I can say.

(b) (5) I can go back and fix those.

(b) (5)

Sorry if this confusing but felt it important to clarify points already made in some responses and add info to Maggie's where she requested it.

Also, I believe 181-182 can best be answered by ORD .

[attachment "Hunton-Williams Comments_69-242_GP adds to MP_122110.docx" deleted by Matthew Klasen/DC/USEPA/US]

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Website: <http://epa.gov/reg3esd1/3ea50.htm>

Matthew Klasen

Hi everyone, Purely for "where are we now" pur...

12/22/2010 06:52:09 AM

From: Matthew Klasen/DC/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Erin Flannery/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA
Cc: John Pomponio/R3/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/22/2010 06:52 AM
Subject: Status of RD comments

Hi everyone,

Purely for "where are we now" purposes, I thought I'd send out a summary of Spruce RD comment responses, based on the tracking spreadsheet and info I've received.

Overall, about 190 comments need responses. All are assigned to someone (based on my assessment) except about ten. 46 responses are drafted or partially drafted. The remainder await responses (or haven't been sent to me). Responses came in yesterday from Kevin, ORD, OST, and Maggie so far (recognizing that Greg Pond is probably still working on some that Maggie originally drafted).

Of the responses not yet drafted, below is a numeric breakdown of who seems to be responsible for those responses (based on the best information I have right now).

Number of Non-Drafted Comments Assigned To Each Person

Dave Kargbo 5
Dave Rider 6
Greg Pond 11
Lou Reynolds 1
Maggie Passmore 13 (note: Greg Pond may be the default to take these now if Maggie's out)
Palmer Hough 42 (working on them on flight to SEA yesterday)
Stef Shamet 48 (will be starting today)
Erin Flannery 9 (working last night / this AM)
Unknown 14 (I need to ID people for these, and some of them not need responses at all)
TOTAL 149

So, to-dos for folks on this list (if you would):

- Take a look at the attached PDF (taken directly from the tracking spreadsheet) and let me know if any of the numbered comment assignments seem wrong. The attachment lists only the responses not yet drafted, and is sorted by person's name.
- Please don't start drafting any questions that you're not currently assigned to on the attached spreadsheet, unless you check with the person it's assigned to and you let me know. This should prevent duplication of effort.

Hope this is helpful, and let me know if you have any questions. My next step is to go through the comments and pick out the "show-stopper"-looking ones as we discussed yesterday afternoon, which I'll then circulate.

Thanks,
Matt

Matt Klasen

U.S. Environmental Protection Agency

Office of Water (IO)

202-566-0780

cell (202) 380-7229[attachment "22 am.pdf" deleted by Greg Pond/R3/USEPA/US]

Margaret
Passmore/R3/USEPA/US
12/26/2010 10:27 AM

To John Forren
cc Greg Pond, Matthew Klasen, Stefania Shamet, Jennifer
Fulton
bcc
Subject Re: Draft answer to 212

Did anyone have any comments/concerns on my draft response for 212?

(b) (5)



ATTACHMENT REDACTED - DELIBERATIVE

212_MP_122610.doc

M

Margaret Passmore
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Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Margaret Passmore

Stef et al. Here's my draft answer. Let me kno...

12/23/2010 10:49:19 AM

From: Margaret Passmore/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stefania
Shamet/R3/USEPA/US@EPA
Date: 12/23/2010 10:49 AM
Subject: Draft answer to 212

Stef et al.

Here's my draft answer. Let me know if you think it is enough or needs changes. Have to sign off for the day - my turn to drive!

M

[attachment "212_MP_122310.doc" deleted by Margaret Passmore/R3/USEPA/US]

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Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Greg Pond/R3/USEPA/US
12/27/2010 05:50 AM

To Margaret Passmore
cc
bcc
Subject Re: if you are on email today



Valley Fill Draft 4-A (NM).xls

here ya go mags. make sure you scroll through each table, i've rearranged some headings (so might be duplicates at the bottom).

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Margaret Passmore

Hi Greg, (b) (5)

12/26/2010 10:34:46 AM

From: Margaret Passmore/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Date: 12/26/2010 10:34 AM
Subject: if you are on email today

Hi Greg,

(b) (5)

Hope you had a good holiday. I have to say, we had a REALLY good time. Amazingly enough, I was able to relax and enjoy myself. Hope you did the same.

Thanks

M

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Date	Time	Stream Name	Ancode	MIle Point	X Location		Locale	Conductivity	pH	Temp	Al Tot	Ca Tot	Cu	Hardness	Fe Tot	Mg Tot	Mn Tot	K	Se	Na	Zn	Acidity	Alkalinity	Carbonat	Chloride	Sulfate	TDS	TSS
#####	10 00	UNT/Copperas Mine Fork RM 8.86	WVOG-65-	0.100	At toe of valley fill		Logan	1074	7.32	14.55	0.13	118	0.003	660	0.75	88.8	0.074	6.0	0.0044	8.8	0.005	5	230	230	10	368	781	22
#####	10 30	UNT/Copperas Mine Fork RM 9.46	WVOG-65-	0.100	At toe of valley fill		Logan	1031	7.00	13.18	0.03	117	0.003	621	0.52	79.9	0.146	7.0	0.0031	6.8	0.005	5	258	258	10	324	707	3
#####	12 00	UNT/Copperas Mine Fork RM 6.92	WVOG-65-	0.500	At toe of valley fill		Logan	1536	6.45	13.87	0.02	154	0.003	887	0.1	122	0.114	10.5	0.0188	14.7	0.005	5	344	344	20	549	1150	2
#####	13 30	UNT/Dingess Run RM 4.82	WVOG-68-	0.200	At toe of valley fill		Logan	1210	7.68	14.92	0.2	135	0.003	746	0.49	99.3	0.035	11.3	0.0377	5.4	0.005	5	181	181	20	464	914	7
#####	14 00	UNT/Ethel Hollow RM 0.41	WVOG-68-	0.350	At toe of valley fill		Logan	2193	7.84	15.86	0.04	199	0.003	1580	0.07	262	0.044	17.6	0.0267	6.9	0.005	5	455	455	20	975	1830	2
#####	15 30	UNT/Mudlick Fork RM 0.66	WVKC-31-H	0.200	At toe of valley fill		Hopkins	3331	6.64	16.01	0.02	395	0.003	2570	0.02	384	0.038	32.6	0.0211	12.0	0.006	5	594	594	40	1750	3090	2
#####	17 00	UNT/Stolling Fork RM 1.02	WVKC-31-H	0.050	At toe of valley fill		Hopkins	3187	7.54	15.95	0.03	385	0.003	2680	0.15	417	0.089	27.5	0.0183	11.7	0.009	5	310	310	40	2020	3160	2
#####	10 30	UNT/Neff Fork RM 0.86	WVKG-5-R	0.300	At toe of valley fill		Twentymil	1031	5.45	13.56	0.14	84.5	0.003	635	0.05	103	2.55	8.8	0.0010	3.0	0.096	5	11	11	10	626	846	2
#####	11 50	UNT/Twentymile Creek RM 22.80	WVKG-5-R	0.100	At toe of valley fill		Twentymil	2127	7.09	13.47	0.61	176	0.003	1630	0.55	289	9.57	14.4	0.0034	4.8	0.323	5	18	18	20	1490	1960	4
#####	12 30	Spruce Run	WVKG-5-Q	0.500	At toe of valley fill		Twentymil	3409	6.47	15.15	0.03	400	0.003	2820	0.05	442	0.713	26.3	0.0068	10.2	0.048	5	225	225	40	2360	3400	2
#####	13 00	UNT/Twentymile Creek RM 19.20	WVKG-5-Q	0.030	At toe of valley fill		Twentymil	2259	6.70	12.19	0.02	351	0.003	1610	0.02	177	0.02	18.5	0.0613	8.4	0.024	5	191	191	20	1330	2050	2
#####	15 20	UNT/Robinson Fork RM 2.13	WVKG-5-P	0.200	At toe of valley fill		Twentymil	3621	7.60	15.18	0.04	409	0.003	3090	0.38	502	0.191	27.6	0.0057	9.7	0.011	5	232	232	40	2530	3590	3
#####	10 30	UNT/Twentymile Creek RM 17.18	WVKG-5-P	0.200	At toe of valley fill		Twentymil	3065	6.88	15.25	0.02	398	0.003	2480	0.13	362	0.416	21.5	0.0049	7.8	0.008	5	202	202	40	1990	2860	3
#####	11 30	UNT/Leatherwood Creek RM 10.76	WVKE-46-J	0.700	At toe of valley fill		Twentymil	2712	6.23	13.88	2.17	294	0.009	2100	0.87	331	14.1	20.8	0.0095	5.8	0.834	5	79	79	40	1720	2580	11
#####	12 20	UNT/Boardtree Branch RM 0.57	WVKG-5-M	0.000	At toe of valley fill		Twentymil	2349	7.49	15.69	0.06	272	0.003	1800	1.77	271	3.20	16.9	0.0020	5.9	0.005	5	305	305	20	1300	2050	4
#####	12 30	Boardtree Branch	WVKG-5-M	0.600	At toe of valley fill		Twentymil	3650	6.66	15.70	0.04	405	0.003	2970	0.1	475	0.263	24.7	0.0070	9.4	0.026	5	174	174	40	2530	3590	2
#####	15 10	UNT/Peachorchard Branch RM 1.33	WVKG-5-L	0.100	At toe of valley fill		Twentymil	1032	6.71	13.94	0.24	101	0.003	594	0.57	83.1	0.783	11.0	0.0060	3.20	0.010	5	76	76	10	497	774	14
10/6/209	16 05	Discharge into UNT/Mudlick Fork RM 0.66	WVKC-31-H	0.11-Mine	Discharging from hills		Hopkins	3944	8.25	15.94	0.02	503	0.003	3500	0.02	544	0.003	38.4	0.0304	15.60	0.005	5	437	437	40	2440	3930	2

XLSTAT 2010.5.02 - Discriminant Analysis (DA) - on 10/3/2010 at 10:18:29 PM

Y / Qualitative: Workbook = Valley Fill Draft 4-A (NM).xls / Sheet = Sheet3 / Range = Sheet3!\$H\$1:\$H\$19 / 18 rows and 1 column

X / Quantitative: Workbook = Valley Fill Draft 4-A (NM).xls / Sheet = Sheet3 / Range = Sheet3!\$J\$1:\$AC\$19 / 18 rows and 20 columns

Within-class covariance matrices are assumed to be equal

Prior probabilities are taken into account

Significance level (%): 5

Model selection: Stepwise (Forward)

Threshold value to enter: 0.05

Threshold value to remove: 0.10

Summary statistics

Summary statistics:

Variable	Categories	Frequencies	%
Locale	Hopkins	3	16.667
	Logan	5	27.778
	Twentymile	10	55.556

Variable	Observations	with missing	without missing	Minimum	Maximum	Mean	std. deviation
pH	18	0	18	5.450	8.250	7.000	0.675
Temp	18	0	18	12.190	16.010	14.683	1.145
Al_Tot	18	0	18	0.020	2.170	0.214	0.509
Ca_Tot	18	0	18	84.500	503.000	272.028	136.356
Cu	18	0	18	0.003	0.009	0.003	0.001
Hardness	18	0	18	594.000	3500.000	1831.833	982.914
Fe_Tot	18	0	18	0.020	1.770	0.367	0.446
Mg_Tot	18	0	18	79.900	544.000	279.561	160.434
Mn_Tot	18	0	18	0.003	14.100	1.797	3.838
K	18	0	18	6.000	38.400	18.967	9.214
Se	18	0	18	0.001	0.061	0.015	0.016
Na	18	0	18	3.000	15.600	8.339	3.579
Zn	18	0	18	0.005	0.834	0.079	0.203
Acidity	18	0	18	5.000	5.000	5.000	0.000
Alkalinity	18	0	18	11.000	594.000	240.111	152.861
Bicarbonat	18	0	18	11.000	594.000	240.111	152.861
Chloride	18	0	18	10.000	40.000	26.667	12.834
Sulfate	18	0	18	324.000	2530.000	1403.500	802.767
TDS	18	0	18	707.000	3930.000	2181.222	1129.541
TSS	18	0	18	2.000	22.000	4.944	5.450

Correlation matrix:

Variables	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	1.000	0.508	-0.283	0.263	-0.285	0.291	0.161	0.296	-0.294	0.308	0.267	0.310	-0.336		0.467	0.467	0.140	0.170	0.240	0.016
Temp	0.508	1.000	-0.264	0.528	-0.175	0.615	-0.028	0.642	-0.299	0.624	-0.139	0.413	-0.292		0.605	0.605	0.588	0.513	0.589	-0.174
Al_Tot	-0.283	-0.264	1.000	-0.090	0.959	-0.028	0.337	0.005	0.913	-0.054	-0.145	-0.318	0.982		-0.413	-0.413	0.147	0.028	-0.008	0.341
Ca_Tot	0.263	0.528	-0.090	1.000	0.040	0.963	-0.297	0.916	-0.119	0.939	0.215	0.615	-0.040		0.407	0.407	0.905	0.932	0.964	-0.452
Cu	-0.285	-0.175	0.959	0.040	1.000	0.068	0.281	0.080	0.800	0.050	-0.085	-0.177	0.928		-0.263	-0.263	0.259	0.098	0.088	0.277
Hardness	0.291	0.615	-0.028	0.963	0.068	1.000	-0.263	0.990	-0.017	0.948	0.046	0.565	0.035		0.358	0.358	0.929	0.979	0.998	-0.451
Fe_Tot	0.161	-0.028	0.337	-0.297	0.281	-0.263	1.000	-0.238	0.421	-0.341	-0.377	-0.430	0.273		-0.215	-0.215	-0.294	-0.254	-0.283	0.444
Mg_Tot	0.296	0.642	0.005	0.916	0.080	0.990	-0.238	1.000	0.036	0.925	-0.044	0.523	0.072		0.321	0.321	0.915	0.975	0.986	-0.438
Mn_Tot	-0.294	-0.299	0.913	-0.119	0.800	-0.017	0.421	0.036	1.000	-0.083	-0.273	-0.397	0.952		-0.492	-0.492	0.078	0.065	0.000	0.194
K	0.308	0.624	-0.054	0.939	0.050	0.948	-0.341	0.925	-0.083	1.000	0.209	0.615	-0.011		0.503	0.503	0.887	0.889	0.945	-0.458
Se	0.267	-0.139	-0.145	0.215	-0.085	0.046	-0.377	-0.044	-0.273	0.209	1.000	0.289	-0.167		0.316	0.316	0.041	-0.022	0.057	-0.225
Na	0.310	0.413	-0.318	0.615	-0.177	0.565	-0.430	0.523	-0.397	0.615	0.289	1.000	-0.293		0.695	0.695	0.545	0.453	0.558	-0.310
Zn	-0.336	-0.292	0.982	-0.040	0.928	0.035	0.273	0.072	0.952	-0.011	-0.167	-0.293	1.000		-0.433	-0.433	0.186	0.105	0.058	0.225
Acidity																				
Alkalinity	0.467	0.605	-0.413	0.407	-0.263	0.358	-0.215	0.321	-0.492	0.503	0.316	0.695	-0.433		1.000	1.000	0.315	0.177	0.336	-0.301
Bicarbonat	0.467	0.605	-0.413	0.407	-0.263	0.358	-0.215	0.321	-0.492	0.503	0.316	0.695	-0.433		1.000	1.000	0.315	0.177	0.336	-0.301
Chloride	0.140	0.588	0.147	0.905	0.259	0.929	-0.294	0.915	0.078	0.887	0.041	0.545	0.186		0.315	0.315	1.000	0.915	0.938	-0.390
Sulfate	0.170	0.513	0.028	0.932	0.098	0.979	-0.254	0.975	0.065	0.889	-0.022	0.453	0.105		0.177	0.177	0.915	1.000	0.985	-0.442

TDS	0.240	0.589	-0.008	0.964	0.088	0.998	-0.283	0.986	0.000	0.945	0.057	0.558	0.058	0.336	0.336	0.938	0.985	1.000	-0.456
TSS	0.016	-0.174	0.341	-0.452	0.277	-0.451	0.444	-0.438	0.194	-0.458	-0.225	-0.310	0.225	-0.301	-0.301	-0.390	-0.442	-0.456	1.000

Discriminant Analysis:

Means by class:

Class \ Variat	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
Hopkins	7.477	15.967	0.023	427.667	0.003	2916.667	0.063	448.333	0.043	32.833	0.023	13.100	0.007	5.000	447.000	447.000	40.000	2070.000	3393.333	2.000
Logan	7.258	14.476	0.084	144.600	0.003	898.800	0.386	130.400	0.083	10.480	0.018	8.520	0.005	5.000	293.600	293.600	16.000	536.000	1076.400	7.200
Twentymil	6.728	14.401	0.337	289.050	0.004	1972.900	0.449	303.510	3.181	19.050	0.011	6.820	0.139	5.000	151.300	151.300	28.000	1637.300	2370.000	4.700

Sum of weights, prior probabilities and logarithms of determinants for each class:

Class	Sum of weights	or probability(Determinant)
Hopkins	3.000	0.167 -12.433
Logan	5.000	0.278 19.116
Twentymil	10.000	0.556 22.784

Multicollinearity statistics:

Statistic	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
Tolerance	0.180	0.055	0.001	0.005	0.002	0.000	0.050	0.000	0.002	0.005	0.022	0.049	0.001	65535.000	0.039	0.000	0.006	0.000	0.000	0.012
VIF	5.556	18.025	951.036	190.210	519.490	10586.320	20.162	1348083.243	568.310	202.229	46.023	20.387	1373.333		25.730		172.315	3772.147	20109.736	85.732

Between-classes covariance matrix:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.146	0.195	-0.065	0.990	0.000	-3.000	-0.053	-1.351	-0.707	0.721	0.002	0.931	-0.030	0.000	50.535	50.535	0.140	-66.826	-17.115	-0.053
Temp	0.195	0.496	-0.079	56.938	0.000	395.465	-0.118	61.399	-0.740	5.162	0.003	1.869	-0.031	0.000	82.651	82.651	4.886	233.770	439.915	-1.082
Al_Tot	-0.065	-0.079	0.029	1.228	0.000	13.288	0.022	2.490	0.318	-0.193	-0.001	-0.392	0.014	0.000	-21.862	-21.862	0.079	39.184	21.417	-0.007
Ca_Tot	0.990	56.938	1.228	13063.095	0.009	93750.939	-11.661	14826.295	42.418	991.329	0.095	154.092	1.959	0.000	3950.200	3950.200	1104.056	75309.658	108501.188	-237.794
Cu	0.000	0.000	0.000	0.009	0.000	0.071	0.000	0.012	0.001	0.000	0.000	-0.001	0.000	0.000	-0.044	-0.044	0.001	0.117	0.094	0.000
Hardness	-3.000	395.465	13.288	93750.939	0.071	673528.678	-80.104	106576.212	353.538	7069.861	0.523	1042.290	16.146	0.000	24875.203	24875.203	7919.667	545497.517	780441.494	-1704.172
Fe_Tot	-0.053	-0.118	0.022	-11.661	0.000	-80.104	0.029	-12.357	0.214	-1.114	-0.001	-0.464	0.009	0.000	-21.352	-21.352	-1.006	-41.490	-87.866	0.225
Mg_Tot	-1.351	61.399	2.490	14826.295	0.012	106576.212	-12.357	16869.406	60.171	1114.190	0.069	159.317	2.735	0.000	3632.476	3632.476	1252.122	86703.240	123575.399	-269.297
Mn_Tot	-0.707	-0.740	0.318	42.418	0.001	353.538	0.214	60.171	3.589	0.079	-0.011	-3.968	0.153	0.000	-231.312	-231.312	3.311	597.051	475.462	-0.602
K	0.721	5.162	-0.193	991.329	0.000	7069.861	-1.114	1114.190	0.079	78.087	0.017	15.759	0.015	0.000	521.905	521.905	84.033	5394.346	8121.869	-18.200
Se	0.002	0.003	-0.001	0.095	0.000	0.523	-0.001	0.069	-0.011	0.017	0.000	0.015	0.000	0.000	0.811	0.811	0.009	-0.584	0.393	-0.002
Na	0.931	1.869	-0.392	154.092	-0.001	1042.290	-0.464	159.317	-3.968	15.759	0.015	7.603	-0.167	0.000	362.704	362.704	13.378	431.926	1120.432	-3.025
Zn	-0.030	-0.031	0.014	1.959	0.000	16.146	0.009	2.735	0.153	0.015	0.000	-0.167	0.007	0.000	-9.794	-9.794	0.154	26.288	21.507	-0.028
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	50.535	82.651	-21.862	3950.200	-0.044	24875.203	-21.352	3632.476	-231.312	521.905	0.811	362.704	-9.794	0.000	18465.706	18465.706	353.222	-2164.508	24098.563	-83.932
Bicarbonat	50.535	82.651	-21.862	3950.200	-0.044	24875.203	-21.352	3632.476	-231.312	521.905	0.811	362.704	-9.794	0.000	18465.706	18465.706	353.222	-2164.508	24098.563	-83.932
Chloride	0.140	4.886	0.079	1104.056	0.001	7919.667	-1.006	1252.122	3.311	84.033	0.009	13.378	0.154	0.000	353.222	353.222	93.333	6337.000	9160.444	-20.111
Sulfate	-66.826	233.770	39.184	75309.658	0.117	545497.517	-41.490	86703.240	597.051	5394.346	-0.584	431.926	26.288	0.000	-2164.508	-2164.508	6337.000	470172.700	638095.417	-1353.533
TDS	-17.115	439.915	21.417	108501.188	0.094	780441.494	-87.866	123575.399	475.462	8121.869	0.393	1120.432	21.507	0.000	24098.563	24098.563	9160.444	638095.417	905597.604	-1969.031
TSS	-0.053	-1.082	-0.007	-237.794	0.000	-1704.172	0.225	-269.297	-0.602	-18.200	-0.002	-3.025	-0.028	0.000	-83.932	-83.932	-20.111	-1353.533	-1969.031	4.337

Within-class covariance matrix for class Hopkins:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.651	-0.029	0.000	41.443	0.000	363.083	0.004	62.912	-0.012	2.081	0.004	1.383	0.000	0.000	-69.700	-69.700	0.000	275.350	327.017	0.000
Temp	-0.029	0.001	0.000	-1.357	0.000	-13.317	-0.001	-2.408	0.000	-0.035	0.000	-0.046	0.000	0.000	4.460	4.460	0.000	-11.450	-11.783	0.000
Al_Tot	0.000	0.000	0.000	-0.213	0.000	-1.183	0.000	-0.157	0.000	-0.027	0.000	-0.007	0.000	0.000	-0.685	-0.685	0.000	-0.250	-1.167	0.000
Ca_Tot	41.443	-1.357	-0.213	4281.333	0.000	32683.333	-2.773	5322.667	-2.406	327.267	0.410	142.000	-0.102	0.000	145.000	145.000	0.000	20230.000	30146.667	0.000
Cu	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hardness	363.083	-13.317	-1.183	32683.333	0.000	258233.333	-15.383	42761.667	-16.243	2295.167	3.044	1085.000	-0.647	0.000	-12185.000	-12185.000	0.000	169300.000	236716.667	0.000
Fe_Tot	0.004	-0.001	0.000	-2.773	0.000	-15.383	0.006	-2.037	0.003	-0.347	0.000	-0.091	0.000	0.000	-8.905	-8.905	0.000	-3.250	-15.167	0.000

Mg_Tot	62.912	-2.408	-0.157	5322.667	0.000	42761.667	-2.037	7136.333	-2.473	357.333	0.489	176.900	-0.095	0.000	-3060.500	-3060.500	0.000	28775.000	39083.333	0.000
Mn_Tot	-0.012	0.000	0.000	-2.406	0.000	-16.243	0.003	-2.473	0.002	-0.233	0.000	-0.079	0.000	0.000	-3.319	-3.319	0.000	-7.750	-15.342	0.000
K	2.081	-0.035	-0.027	327.267	0.000	2295.167	-0.347	357.333	-0.233	29.743	0.033	10.820	-0.011	0.000	320.350	320.350	0.000	1200.500	2151.333	0.000
Se	0.004	0.000	0.000	0.410	0.000	3.044	0.000	0.489	0.000	0.033	0.000	0.014	0.000	0.000	0.145	0.145	0.000	1.791	2.822	0.000
Na	1.383	-0.046	-0.007	142.000	0.000	1085.500	-0.091	176.900	-0.079	10.820	0.014	4.710	-0.003	0.000	2.550	2.550	0.000	673.500	1001.000	0.000
Zn	0.000	0.000	0.000	-0.102	0.000	-0.647	0.000	-0.095	0.000	-0.011	0.000	-0.003	0.000	0.000	-0.201	-0.201	0.000	-0.260	-0.618	0.000
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	-69.700	4.460	-0.685	145.000	0.000	-12185.000	-8.905	-3060.500	-3.319	320.350	0.145	2.550	-0.201	0.000	20239.000	20239.000	0.000	-21945.000	-8995.000	0.000
Bicarbonat	-69.700	4.460	-0.685	145.000	0.000	-12185.000	-8.905	-3060.500	-3.319	320.350	0.145	2.550	-0.201	0.000	20239.000	20239.000	0.000	-21945.000	-8995.000	0.000
Chloride	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sulfate	275.350	-11.450	-0.250	20230.000	0.000	169300.000	-3.250	28775.000	-7.750	1200.500	1.791	673.500	-0.260	0.000	-21945.000	-21945.000	0.000	120900.000	153650.000	0.000
TDS	327.017	-11.783	-1.167	30146.667	0.000	236716.667	-15.167	39083.333	-15.342	2151.333	2.822	1001.000	-0.618	0.000	-8995.000	-8995.000	0.000	153650.000	217233.333	0.000
TSS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Within-class covariance matrix for class Logan:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.310	0.455	0.023	6.371	0.000	99.594	0.020	20.176	-0.021	1.273	0.004	-1.698	0.000	0.000	2.734	2.734	0.490	64.722	96.896	0.773
Temp	0.455	1.041	0.026	24.783	0.000	306.112	-0.091	58.947	-0.044	3.596	0.010	-1.281	0.000	0.000	46.068	46.068	3.055	207.513	345.790	0.601
Al_Tot	0.023	0.026	0.006	-0.961	0.000	-10.732	0.013	-2.012	-0.002	-0.059	0.001	-0.145	0.000	0.000	-6.098	-6.098	0.020	-6.195	-12.587	0.362
Ca_Tot	6.371	24.783	-0.961	1152.300	0.000	13108.150	-8.565	2469.750	-0.717	148.715	0.266	9.985	0.000	0.000	3252.300	3252.300	135.500	8753.750	15324.950	-151.900
Cu	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hardness	99.594	306.112	-10.732	13108.150	0.000	155429.700	-87.981	29615.025	-8.738	1690.295	2.573	-72.195	0.000	0.000	37908.400	37908.400	1291.500	102226.750	177614.850	-1454.450
Fe_Tot	0.020	-0.091	0.013	-8.565	0.000	-87.981	0.086	-16.082	0.001	-1.067	-0.002	-0.427	0.000	0.000	-26.262	-26.262	-1.245	-59.873	-108.276	1.984
Mg_Tot	20.176	58.947	-2.012	2469.750	0.000	29615.025	-16.082	5659.285	-1.677	318.358	0.461	-23.215	0.000	0.000	7190.575	7190.575	230.250	19399.300	33637.375	-259.500
Mn_Tot	-0.021	-0.044	-0.002	-0.717	0.000	-8.738	0.001	-1.677	0.002	-0.124	-0.001	0.073	0.000	0.000	-0.249	-0.249	-0.137	-6.277	-9.982	-0.087
K	1.273	3.596	-0.059	148.715	0.000	1690.295	-1.067	318.358	-0.124	20.887	0.048	-2.310	0.000	0.000	366.665	366.665	19.900	1139.325	1960.710	-22.245
Se	0.004	0.010	0.001	0.266	0.000	2.573	-0.002	0.461	-0.001	0.048	0.000	-0.012	0.000	0.000	0.155	0.155	0.072	1.964	3.234	-0.048
Na	-1.698	-1.281	-0.145	9.985	0.000	-72.195	-0.427	-23.215	0.073	-2.310	-0.012	13.397	0.000	0.000	111.185	111.185	3.600	-22.150	73.340	-2.930
Zn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	2.734	46.068	-6.098	3252.300	0.000	37908.400	-26.262	7190.575	-0.249	366.665	0.155	111.185	0.000	0.000	11645.300	11645.300	248.000	24462.250	43891.200	-467.650
Bicarbonat	2.734	46.068	-6.098	3252.300	0.000	37908.400	-26.262	7190.575	-0.249	366.665	0.155	111.185	0.000	0.000	11645.300	11645.300	248.000	24462.250	43891.200	-467.650
Chloride	0.490	3.055	0.020	135.500	0.000	1291.500	-1.245	230.250	0.137	19.900	0.072	3.600	0.000	0.000	248.000	248.000	30.000	950.000	1662.000	-26.500
Sulfate	64.722	207.513	-6.195	8753.750	0.000	102226.750	-59.873	19399.300	-6.277	1139.325	1.964	-22.150	0.000	0.000	24462.250	24462.250	950.000	67810.500	117855.000	-983.000
TDS	96.896	345.790	-12.587	15324.950	0.000	177614.850	-108.276	33637.375	-9.982	1960.710	3.234	73.340	0.000	0.000	43891.200	43891.200	1662.000	117855.000	205855.300	-1772.350
TSS	0.773	0.601	0.362	-151.900	0.000	-1454.450	1.984	-259.500	-0.087	-22.245	-0.048	-2.930	0.000	0.000	-467.650	-467.650	-26.500	-983.000	-1772.350	72.700

Within-class covariance matrix for class Twentymile:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.383	0.286	-0.108	32.370	0.000	243.386	0.152	39.403	-0.485	1.627	0.000	0.621	-0.047	0.000	37.993	37.993	1.884	172.770	253.127	-0.158
Temp	0.286	1.354	-0.197	69.122	0.000	647.092	0.171	115.334	-1.478	3.967	-0.014	1.286	-0.087	0.000	68.380	68.380	8.458	490.074	700.824	-0.875
Al_Tot	-0.108	-0.197	0.448	-12.981	0.001	-38.790	0.109	-1.614	2.945	-0.190	-0.001	-0.504	0.173	0.000	-28.727	-28.727	1.693	-27.987	-30.900	1.635
Ca_Tot	32.370	69.122	-12.981	16238.803	0.003	105741.561	-14.149	15820.772	-172.936	766.597	0.542	325.043	-4.663	0.000	9269.094	9269.094	1460.111	83807.594	122260.667	-249.261
Cu	0.000	0.000	0.001	0.003	0.000	0.085	0.000	0.018	0.007	0.001	0.000	-0.001	0.000	0.000	-0.048	-0.048	0.008	0.055	0.140	0.004
Hardness	243.386	647.092	-38.790	105741.561	0.085	800390.767	-67.966	130209.734	-583.418	5530.061	-1.174	2155.669	-8.181	0.000	54222.367	54222.367	11008.667	648292.922	919859.556	-1645.589
Fe_Tot	0.152	0.171	0.109	-14.149	0.000	-67.966	0.298	-8.077	1.075	-0.606	-0.003	-0.467	0.035	0.000	14.434	14.434	-1.280	-89.143	-100.080	0.855
Mg_Tot	39.403	115.334	-1.614	15820.772	0.018	130209.734	-8.077	22024.490	-37.290	877.549	-0.619	326.071	0.816	0.000	7526.552	7526.552	1788.689	106595.497	149182.267	-248.286
Mn_Tot	-0.485	-1.478	2.945	-172.936	0.007	-583.418	1.075	-37.290	23.042	-5.539	-0.017	-0.517	1.196	0.000	-236.020	-236.020	2.876	-414.830	-626.318	8.507
K	1.627	3.967	-0.190	766.597	0.001	5530.061	-0.606	877.549	-5.539	40.341	0.006	15.902	-0.058	0.000	406.894	406.894	77.333	4449.906	6399.867	-9.272
Se	0.000	-0.014	-0.001	0.542	0.000	-1.174	-0.003	-0.619	-0.017	0.006	0.000	0.013	0.000	0.000	0.264	0.264	-0.028	-1.011	-0.651	-0.012
Na	0.621	1.286	-0.504	325.043	-0.001	2155.669	-0.467	326.071	-5.017	15.902	0.013	7.055	-0.178	0.000	184.738	184.738	27.822	1743.504	2513.867	-6.071
Zn	-0.047	-0.087	0.173	-4.663	0.000	-8.181	0.035	0.816	1.196	-0.058	0.000	-0.178	0.069	0.000	-12.270	-12.270	0.711	-2.846	-3.370	0.507
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	37.993	68.380	-28.727	9269.094	-0.048	54222.367	14.434	7526.552	-236.020	406.894	0.264	184.738	-12.270	0.000	9842.233	9842.233	585.111	37868.122	59831.111	-153.567
Bicarbonat	37.993	68.380	-28.727	9269.094	-0.048	54222.367	14.434	7526.552	-236.020	406.894	0.264	184.738	-12.270	0.000	9842.233	9842.233	585.111	37868.122	59831.111	-153.567
Chloride	1.884	8.458	1.693	1460.111	0.008	11008.667	-1.280	1788.689	2.876	77.333	-0.028	27.822	0.711	0.000	585.111	585.111	173.333	8931.778	12733.333	-12.889
Sulfate	172.770	490.074	-27.987	83807.594	0.055	648292.922	-89.143	106595.497	-414.830	4449.906	-1.011	1743.504	-2.846	0.000	37868.122	37868.122	8931.778	533363.567	748951.556	-1407.011
TDS	253.127	700.824	-30.900	122260.667	0.140	919859.556	-100.080	149182.267	-626.318	6399.867	-0.651	2513.867	-3.370	0.000	59831.111	59831.111	12733.333	748951.556	1062732.444	-1890.222
TSS	-0.158	-0.875	1.635	-249.261	0.004	-1645.589	0.855	-248.286	8.507	-9.272	-0.012	-6.071	0.507	0.000	-153.567	-153.567	-12.889	-1407.011	-1890.222	18.011

Pooled within-class covariance matrix:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.399	0.289	-0.059	26.647	0.000	221.002	0.097	37.410	-0.298	1.593	0.001	0.104	-0.028	0.000	14.231	14.231	1.261	157.634	221.317	0.111
Temp	0.289	1.090	-0.111	47.901	0.000	468.110	0.078	84.599	-0.899	3.335	-0.006	0.424	-0.052	0.000	53.907	53.907	5.889	347.854	511.134	-0.365
Al_Tot	-0.059	-0.111	0.270	-8.073	0.001	-26.294	0.069	-1.526	-0.133	-0.001	-0.342	0.104	0.000	-18.954	-18.954	1.021	-18.477	-22.052	1.077	
Ca_Tot	26.647	47.901	-8.073	10621.406	0.002	71298.221	-11.143	10860.752	-104.274	543.251	0.451	216.622	-2.812	0.000	6448.070	6448.070	912.200	55316.223	81462.609	-190.063
Cu	0.000	0.000	0.001	0.002	0.000	0.051	0.000	0.011	0.004	0.001	0.000	0.000	0.000	0.000	-0.029	-0.029	0.005	0.033	0.084	0.003
Hardness	221.002	468.110	-26.294	71298.221	0.051	556113.491	-66.292	91724.736	-354.547	4074.804	0.387	1418.883	-4.995	0.000	41017.660	41017.660	6949.600	438809.553	630841.916	-1375.207
Fe_Tot	0.097	0.078	0.069	-11.143	0.000	-66.292	0.202	-9.406	0.646	-0.695	-0.002	-0.406	0.021	0.000	0.470	0.470	-1.100	-69.885	-90.944	1.042
Mg_Tot	37.410	84.599	-1.526	10860.752	0.011	91724.736	-9.406	15675.348	-23.151	659.069	-0.183	213.039	0.477	0.000	6025.351	6025.351	1134.613	72967.111	103690.438	-218.171
Mn_Tot	-0.298	-0.899	1.766	-104.274	0.004	-354.547	0.646	-23.151	13.826	-3.387	-0.010	-3.001	0.717	0.000	-142.121	-142.121	1.689	-251.605	-380.498	5.081
K	1.593	3.335	-0.133	543.251	0.001	4074.804	-0.695	659.069	-3.387	33.740	0.021	10.368	-0.036	0.000	384.627	384.627	51.707	3133.830	4649.620	-11.495
Se	0.001	-0.006	-0.001	0.451	0.000	0.387	-0.002	-0.183	-0.010	0.021	0.000	0.006	0.000	0.000	0.219	0.219	0.002	0.156	0.848	-0.020
Na	0.104	0.424	-0.342	216.622	0.000	1418.883	-0.406	213.039	-3.001	10.368	0.006	8.434	-0.107	0.000	140.832	140.832	17.653	1129.996	1661.344	-4.424
Zn	-0.028	-0.052	0.104	-2.812	0.000	-4.995	0.021	0.477	0.717	-0.036	0.000	-0.107	0.041	0.000	-7.389	-7.389	0.427	-1.742	-2.105	0.304
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	14.231	53.907	-18.954	6448.070	-0.029	41017.660	0.470	6025.351	-142.121	384.627	0.219	140.832	-7.389	0.000	11709.287	11709.287	417.200	26318.140	46403.653	-216.847
Bicarbonat	14.231	53.907	-18.954	6448.070	-0.029	41017.660	0.470	6025.351	-142.121	384.627	0.219	140.832	-7.389	0.000	11709.287	11709.287	417.200	26318.140	46403.653	-216.847
Chloride	1.261	5.889	1.021	912.200	0.005	6949.600	-1.100	1134.613	1.689	51.707	0.002	17.653	0.427	0.000	417.200	417.200	112.000	5612.400	8083.200	-14.800
Sulfate	157.634	347.854	-18.477	55316.223	0.033	438809.553	-69.885	72967.111	-251.605	3133.830	0.156	1129.996	-1.742	0.000	26318.140	26318.140	5612.400	354220.940	501285.600	-1106.340
TDS	221.317	511.134	-22.052	81462.609	0.084	630841.916	-90.944	103690.438	-380.498	4649.620	0.848	1661.344	-2.105	0.000	46403.653	46403.653	8083.200	501285.600	721498.658	-1606.760
TSS	0.111	-0.365	1.077	-190.063	0.003	-1375.207	1.042	-218.171	5.081	-11.495	-0.020	-4.424	0.304	0.000	-216.847	-216.847	-14.800	-1106.340	-1606.760	30.193

Total covariance matrix:

	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.456	0.393	-0.097	24.211	0.000	192.884	0.049	32.055	-0.762	1.915	0.003	0.749	-0.046	0.000	48.229	48.229	1.212	91.918	183.199	0.061
Temp	0.393	1.312	-0.154	82.457	0.000	692.189	-0.014	117.986	-1.315	6.586	-0.003	1.694	-0.068	0.000	105.907	105.907	8.645	471.944	761.529	-1.086
Al_Tot	-0.097	-0.154	0.259	-6.256	0.001	-13.820	0.077	0.411	1.783	-0.254	-0.001	-0.579	0.101	0.000	-32.156	-32.156	0.957	11.356	-4.340	0.946
Ca_Tot	24.211	82.457	-6.256	18592.837	0.008	129087.328	-18.063	20048.636	-62.064	1179.101	0.465	299.908	-1.098	0.000	8477.850	8477.850	1584.216	101968.191	148467.846	-335.557
Cu	0.000	0.000	0.001	0.008	0.000	0.095	0.000	0.018	0.004	0.001	0.000	-0.001	0.000	0.000	-0.057	-0.057	0.005	0.112	0.141	0.002
Hardness	192.884	692.189	-13.820	129087.328	0.095	966120.382	-115.037	156163.858	-63.279	8585.906	0.711	1987.689	6.990	0.000	53751.020	53751.020	11722.353	772241.971	1107525.098	-2416.363
Fe_Tot	0.049	-0.014	0.077	-18.063	0.000	-115.037	0.199	-17.022	0.721	-1.399	-0.003	-0.686	0.025	0.000	-14.657	-14.657	-1.680	-90.950	-142.268	1.078
Mg_Tot	32.055	117.986	0.411	20048.636	0.018	156163.858	-17.022	25739.005	22.047	1368.019	-0.113	300.434	2.351	0.000	7880.587	7880.587	1884.980	125585.032	178721.256	-382.596
Mn_Tot	-0.762	-1.315	1.783	-62.064	0.004	-63.279	0.721	22.047	14.733	-2.933	-0.017	-5.449	0.741	0.000	-288.680	-288.680	3.828	199.443	-0.113	4.058
K	1.915	6.586	-0.254	1179.101	0.001	8585.906	-1.399	1368.019	-2.933	84.891	0.031	20.273	-0.021	0.000	707.780	707.780	104.941	6572.918	9835.690	-22.990
Se	0.003	-0.003	-0.001	0.465	0.000	0.711	-0.003	-0.113	-0.017	0.031	0.000	0.016	-0.001	0.000	0.766	0.766	0.008	-0.275	1.026	-0.019
Na	0.749	1.694	-0.579	299.908	-0.001	1987.689	-0.686	300.434	-5.449	20.273	0.016	12.808	-0.213	0.000	380.290	380.290	25.020	1301.944	2256.785	-6.039
Zn	-0.046	-0.068	0.101	-1.098	0.000	6.990	0.025	2.351	0.741	-0.021	-0.001	-0.213	0.041	0.000	-13.433	-13.433	0.485	17.019	13.324	0.248
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	48.229	105.907	-32.156	8477.850	-0.057	53751.020	-14.657	7880.587	-288.680	707.780	0.766	380.290	-13.433	0.000	23366.340	23366.340	617.451	21694.000	57955.150	-250.582
Bicarbonat	48.229	105.907	-32.156	8477.850	-0.057	53751.020	-14.657	7880.587	-288.680	707.780	0.766	380.290	-13.433	0.000	23366.340	23366.340	617.451	21694.000	57955.150	-250.582
Chloride	1.212	8.645	0.957	1584.216	0.005	11722.353	-1.680	1884.980	3.828	104.941	0.008	25.020	0.485	0.000	617.451	617.451	164.706	9425.294	13598.431	-27.255
Sulfate	91.918	471.944	11.356	101968.191	0.112	772241.971	-90.950	125585.032	199.443	6572.918	-0.275	1301.944	17.019	0.000	21694.000	21694.000	9425.294	644434.500	892731.118	-1931.618
TDS	183.199	761.529	-4.340	148467.846	0.141	1107525.098	-142.268	178721.256	-0.113	9835.690	1.026	2256.785	13.324	0.000	57955.150	57955.150	13598.431	892731.118	1275861.830	-2807.634
TSS	0.061	-1.086	0.946	-335.557	0.002	-2416.363	1.078	-382.596	4.058	-22.990	-0.019	-6.039	0.248	0.000	-250.582	-250.582	-27.255	-1931.618	-2807.634	29.703

Summary of the variables selection:

No. of variabl	Variables	riable IN/OI	Status	Partial R ²	F	Pr > F	Wilks' Lambd	Pr < Lambda
1	K	K	IN	0.649	13.886	0.000	0.351	0.000
2	K / Alkalinity	Alkalinity	IN	0.630	11.917	0.001	0.130	< 0.0001
3	K / Alkalinity / Sulfate	Sulfate	IN	0.381	3.994	0.044	0.080	< 0.0001

Box test (Chi-square asymptotic approximation):

-2Log(M)	92.224
Chi-square	52.538
Chi-square	21.026

DF	12
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The within-class covariance matrices are equal.

Ha: The within-class covariance matrices are different.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Box test (Fisher's F asymptotic approximation):

-2Log(M)	92.224
F (Observe)	3.839
F (Critical v)	1.809
DF1	12
DF2	171
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The within-class covariance matrices are equal.

Ha: The within-class covariance matrices are different.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Kullback's test:

K (Observe)	46.112
K (Critical v)	21.026
DF	12
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The within-class covariance matrices are equal.

Ha: The within-class covariance matrices are different.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Wilks' Lambda test (Rao's approximation):

Lambda	0.080
F (Observe)	10.951
F (Critical v)	2.474
DF1	6
DF2	26
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The means vectors of the 3 classes are equal.

Ha: At least one of the means vector is different from another.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Unidimensional test of equality of the means of the classes:

Variable	Lambda	F	DF1	DF2	p-value
pH			2	15	

Temp			2	15	
Al_Tot			2	15	
Ca_Tot			2	15	
Cu			2	15	
Hardness			2	15	
Fe_Tot			2	15	
Mg_Tot			2	15	
Mn_Tot			2	15	
K	0.351	13.886	2	15	0.000
Se			2	15	
Na			2	15	
Zn			2	15	
Acidity			2	15	
Alkalinity	0.442	9.462	2	15	0.002
Bicarbonate			2	15	
Chloride			2	15	
Sulfate	0.485	7.964	2	15	0.004
TDS			2	15	
TSS			2	15	

Pillai's trace:

Trace	1.426
F (Observe)	11.586
F (Critical v)	2.445
DF1	6
DF2	28
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The means vectors of the 3 classes are equal.

Ha: At least one of the means vector is different from another.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Hotelling-Lawley trace:

Trace	5.145
F (Observe)	10.811
F (Critical v)	2.756
DF1	6
DF2	16
p-value	< 0.0001
alpha	0.05

Test interpretation:

H0: The means vectors of the 3 classes are equal.

Ha: At least one of the means vector is different from another.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

Roy's greatest root:

Root	3.138
F (Observe)	14.644
F (Critical v)	3.344
DF1	3
DF2	14
p-value	0.000
alpha	0.05

Test interpretation:

H0: The means vectors of the 3 classes are equal.

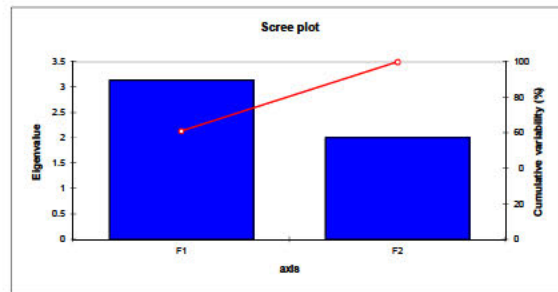
Ha: At least one of the means vector is different from another.

As the computed p-value is lower than the significance level $\alpha=0.05$, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha

The risk to reject the null hypothesis H0 while it is true is lower than 0.01%.

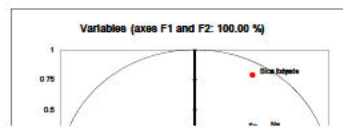
Eigenvalues:

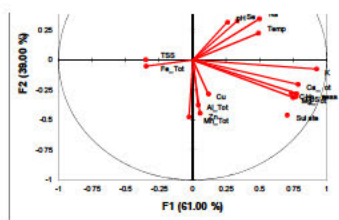
	F1	F2
Eigenvalue	3.138	2.007
Discrimina	60.997	39.003
Cumulative	60.997	100.000



Variables/Factors correlations:

	F1	F2
pH	0.260	0.317
Temp	0.490	0.224
Al_Tot	0.040	-0.372
Ca_Tot	0.785	-0.202
Cu	0.116	-0.282
Hardness	0.774	-0.278
Fe_Tot	-0.350	-0.051
Mg_Tot	0.746	-0.310
Mn_Tot	-0.028	-0.473
K	0.923	-0.074
Se	0.332	0.326
Na	0.497	0.345
Zn	0.054	-0.440
Acidity		
Alkalinity	0.429	0.791
Bicarbonat	0.429	0.791
Chloride	0.735	-0.276
Sulfate	0.704	-0.457
TDS	0.771	-0.302
TSS	-0.351	0.005





Classification functions:

	Hopkins	Logan	Twentymile
Intercept	-25.819	-5.426	-6.722
pH	0.000	0.000	0.000
Temp	0.000	0.000	0.000
Al_Tot	0.000	0.000	0.000
Ca_Tot	0.000	0.000	0.000
Cu	0.000	0.000	0.000
Hardness	0.000	0.000	0.000
Fe_Tot	0.000	0.000	0.000
Mg_Tot	0.000	0.000	0.000
Mn_Tot	0.000	0.000	0.000
K	2.726	0.490	1.123
Se	0.000	0.000	0.000
Na	0.000	0.000	0.000
Zn	0.000	0.000	0.000
Acidity	0.000	0.000	0.000
Alkalinity	-0.012	0.018	-0.014
Bicarbonat	0.000	0.000	0.000
Chloride	0.000	0.000	0.000
Sulfate	-0.017	-0.004	-0.004
TDS	0.000	0.000	0.000
TSS	0.000	0.000	0.000

Prior and posterior classification, membership probabilities, scores and squared distances

Observation	Prior	Posterior	Pr(Hopkins)	Pr(Logan)	Pr(Twentymile)	F1	F2	D ² (Hopkins)	D ² (Logan)	D ² (Twentymile)
Obs1	Logan	Logan	0.000	0.994	0.006	-2.957	1.068	42.024	4.232	14.368
Obs2	Logan	Logan	0.000	0.995	0.005	-2.548	1.428	37.071	3.189	13.891
Obs3	Logan	Logan	0.000	0.997	0.003	-2.079	1.950	32.462	3.017	14.958
Obs4	Logan	Logan	0.001	0.526	0.473	-0.555	0.719	20.032	6.431	6.643
Obs5	Logan	Logan	0.000	0.994	0.006	-0.680	2.513	20.959	5.222	15.503
Obs6	Hopkins	Hopkins	1.000	0.000	0.000	3.160	3.083	6.864	29.253	29.742
Obs7	Hopkins	Twentymile	0.296	0.002	0.702	1.760	-0.048	7.584	17.523	5.854
Obs8	Twentymile	Twentymile	0.000	0.020	0.980	-1.146	-1.132	30.879	12.288	4.521
Obs9	Twentymile	Twentymile	0.000	0.001	0.999	-1.016	-2.266	34.378	17.647	3.342
Obs10	Twentymile	Twentymile	0.001	0.000	0.999	0.784	-1.403	17.619	18.464	2.772
Obs11	Twentymile	Twentymile	0.001	0.017	0.982	0.271	-0.322	15.213	10.392	2.234
Obs12	Twentymile	Twentymile	0.001	0.000	0.999	0.867	-1.569	18.605	20.357	3.497
Obs13	Twentymile	Twentymile	0.000	0.004	0.996	-0.236	-1.197	22.516	13.053	1.891
Obs14	Twentymile	Twentymile	0.000	0.000	1.000	0.886	-1.840	19.498	21.582	3.198
Obs15	Twentymile	Logan	0.000	0.663	0.337	-1.019	0.642	22.658	4.458	5.812
Obs16	Twentymile	Twentymile	0.000	0.000	1.000	-0.105	-2.199	28.939	21.289	4.294
Obs17	Twentymile	Twentymile	0.000	0.041	0.959	-0.179	-0.257	21.488	12.136	5.835
Obs18	Hopkins	Hopkins	1.000	0.000	0.000	4.791	0.830	6.380	46.196	29.102

Confusion matrix for the estimation sample:

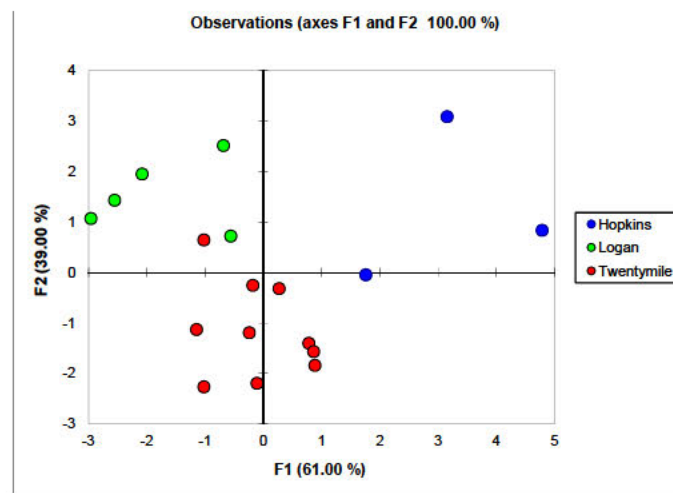
from \ to	Hopkins	Logan	Twentymile	Total	% correct
Hopkins	2	0	1	3	66.67%
Logan	0	5	0	5	100.00%
Twentymile	0	1	9	10	90.00%
Total	2	6	10	18	88.89%

Cross-validation: Prior and posterior classification, membership probabilities, scores and squared distances

Observation	Prior	Posterior	Hopkins	Logan	Twentymile
Obs1	Logan	Logan	0.000	0.987	0.013
Obs2	Logan	Logan	0.000	0.992	0.008
Obs3	Logan	Logan	0.000	0.996	0.004
Obs4	Logan	Twentymile	0.001	0.091	0.908
Obs5	Logan	Logan	0.002	0.982	0.016
Obs6	Hopkins	Hopkins	0.999	0.001	0.000
Obs7	Hopkins	Twentymile	0.009	0.008	0.983
Obs8	Twentymile	Twentymile	0.000	0.059	0.941
Obs9	Twentymile	Twentymile	0.000	0.001	0.999
Obs10	Twentymile	Twentymile	0.001	0.000	0.998
Obs11	Twentymile	Twentymile	0.002	0.024	0.974
Obs12	Twentymile	Twentymile	0.001	0.000	0.998
Obs13	Twentymile	Twentymile	0.000	0.006	0.994
Obs14	Twentymile	Twentymile	0.001	0.000	0.999
Obs15	Twentymile	Logan	0.000	0.911	0.089
Obs16	Twentymile	Twentymile	0.000	0.000	1.000
Obs17	Twentymile	Twentymile	0.002	0.215	0.783
Obs18	Hopkins	Hopkins	1.000	0.000	0.000

Confusion matrix for the cross-validation results:

from \ to	Hopkins	Logan	Twentymile	Total	% correct
Hopkins	2	0	1	3	66.67%
Logan	0	4	1	5	80.00%
Twentymile	0	1	9	10	90.00%
Total	2	5	11	18	83.33%



XLSTAT 2010.5.02 - Similarity/Dissimilarity matrices (correlation...) - on 10/3/2010 at 9:22:28 PM
 Data: Workbook = Valley Fill Draft 4-A (NM).xls / Sheet = Sheet3 / Range = Sheet3!\$G\$1:\$AA\$19 / 18 rows and 21 columns
 Similarity: Spearman correlation coefficient

Summary statistics

Summary statistics:

Variable	Observations	with missing	without missing	Minimum	Maximum	Mean	std. deviation
Conductivity	18	0	18	1031.000	3944.000	2375.611	1033.294
pH	18	0	18	5.450	8.250	7.000	0.675
Temp	18	0	18	12.190	16.010	14.683	1.145
Al_Tot	18	0	18	0.020	2.170	0.214	0.509
Ca_Tot	18	0	18	84.500	503.000	272.028	136.356
Cu	18	0	18	0.003	0.009	0.003	0.001
Hardness	18	0	18	594.000	3500.000	1831.833	982.914
Fe_Tot	18	0	18	0.020	1.770	0.367	0.446
Mg_Tot	18	0	18	79.900	544.000	279.561	160.434
Mn_Tot	18	0	18	0.003	14.100	1.797	3.838
K	18	0	18	6.000	38.400	18.967	9.214
Se	18	0	18	0.001	0.061	0.015	0.016
Na	18	0	18	3.000	15.600	8.339	3.579
Zn	18	0	18	0.005	0.834	0.079	0.203
Acidity	18	0	18	5.000	5.000	5.000	0.000
Alkalinity	18	0	18	11.000	594.000	240.111	152.861
Bicarbonate	18	0	18	11.000	594.000	240.111	152.861
Chloride	18	0	18	10.000	40.000	26.667	12.834
Sulfate	18	0	18	324.000	2530.000	1403.500	802.767
TDS	18	0	18	707.000	3930.000	2181.222	1129.541
TSS	18	0	18	2.000	22.000	4.944	5.450

Proximity matrix (Spearman correlation coefficient):

N=18 VFs	Conductivity	pH	Temp	Al_Tot	Ca_Tot	Cu	Hardness	Fe_Tot	Mg_Tot	Mn_Tot	K	Se	Na	Zn	Acidity	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS
pH	0.157	1	0.412	-0.012	0.185	-0.351	0.170	0.144	0.129	-0.457	0.176	0.197	0.112	-0.565	0.000	0.404	0.404	0.031	0.035	0.120	0.160
Temp	0.676	0.412	1	-0.301	0.600	-0.164	0.633	-0.238	0.633	-0.298	0.692	0.284	0.523	-0.297	0.000	0.598	0.598	0.623	0.547	0.622	-0.309
Al_Tot	-0.415	-0.012	-0.301	1	-0.500	0.403	-0.378	0.696	-0.334	0.590	-0.433	-0.384	-0.776	0.357	0.000	-0.657	-0.657	-0.371	-0.307	-0.396	0.687
Ca_Tot	0.982	0.185	0.600	-0.500	1	0.023	0.969	-0.413	0.942	-0.205	0.926	0.352	0.676	0.150	0.000	0.344	0.344	0.916	0.927	0.971	-0.428
Cu	0.070	-0.351	-0.164	0.403	0.023	1	0.070	0.352	0.070	0.397	0.070	0.070	-0.210	0.409	0.000	-0.257	-0.257	0.251	0.070	0.070	0.326
Hardness	0.983	0.170	0.633	-0.378	0.969	0.070	1	-0.343	0.988	-0.094	0.924	0.259	0.643	0.218	0.000	0.307	0.307	0.931	0.956	0.992	-0.414
Fe_Tot	-0.373	0.144	-0.238	0.696	-0.413	0.352	-0.343	1	-0.378	0.553	-0.465	-0.513	-0.517	-0.038	0.000	-0.310	-0.310	-0.319	-0.381	-0.408	0.877
Mg_Tot	0.965	0.129	0.633	-0.334	0.942	0.070	0.988	-0.378	1	-0.032	0.924	0.226	0.595	0.292	0.000	0.257	0.257	0.920	0.977	0.986	-0.451
Mn_Tot	-0.152	-0.457	-0.298	0.590	-0.205	0.397	-0.094	0.553	-0.032	1	-0.218	-0.725	-0.554	0.594	0.000	-0.587	-0.587	-0.067	0.043	-0.110	0.378
K	0.942	0.176	0.692	-0.433	0.926	0.070	0.924	-0.465	0.924	-0.218	1	0.432	0.600	0.203	0.000	0.362	0.362	0.920	0.907	0.940	-0.460
Se	0.348	0.197	0.284	-0.384	0.352	0.070	0.259	-0.513	0.226	-0.725	0.432	1	0.453	-0.195	0.000	0.360	0.360	0.372	0.184	0.310	-0.377
Na	0.666	0.112	0.523	-0.776	0.676	-0.210	0.643	-0.517	0.595	-0.554	0.600	0.453	1	-0.294	0.000	0.728	0.728	0.592	0.514	0.630	-0.568
Zn	0.173	-0.565	-0.297	0.357	0.150	0.409	0.218	-0.038	0.292	0.594	0.203	-0.195	-0.294	1	0.000	-0.701	-0.701	0.258	0.429	0.262	-0.043
Acidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alkalinity	0.341	0.404	0.598	-0.657	0.344	-0.257	0.307	-0.310	0.257	-0.587	0.362	0.360	0.728	-0.701	0.000	1	1.000	0.273	0.115	0.268	-0.411
Bicarbonate	0.341	0.404	0.598	-0.657	0.344	-0.257	0.307	-0.310	0.257	-0.587	0.362	0.360	0.728	-0.701	0.000	1.000	1	0.273	0.115	0.268	-0.411
Chloride	0.932	0.031	0.623	-0.371	0.916	0.251	0.931	-0.319	0.920	-0.067	0.920	0.372	0.592	0.258	0.000	0.273	0.273	1	0.898	0.932	-0.371
Sulfate	0.941	0.035	0.547	-0.307	0.927	0.070	0.956	-0.381	0.977	0.043	0.907	0.184	0.514	0.429	0.000	0.115	0.115	0.898	1	0.971	-0.448
TDS	0.986	0.120	0.622	-0.396	0.971	0.070	0.992	-0.408	0.986	-0.110	0.940	0.310	0.630	0.262	0.000	0.268	0.268	0.932	0.971	1	-0.464
TSS	-0.418	0.160	-0.309	0.687	-0.428	0.326	-0.414	0.877	-0.451	0.378	-0.460	-0.377	-0.568	-0.043	0.000	-0.411	-0.411	-0.371	-0.448	-0.464	1

List of similar objects(Dissimilarity threshold = 0.9):

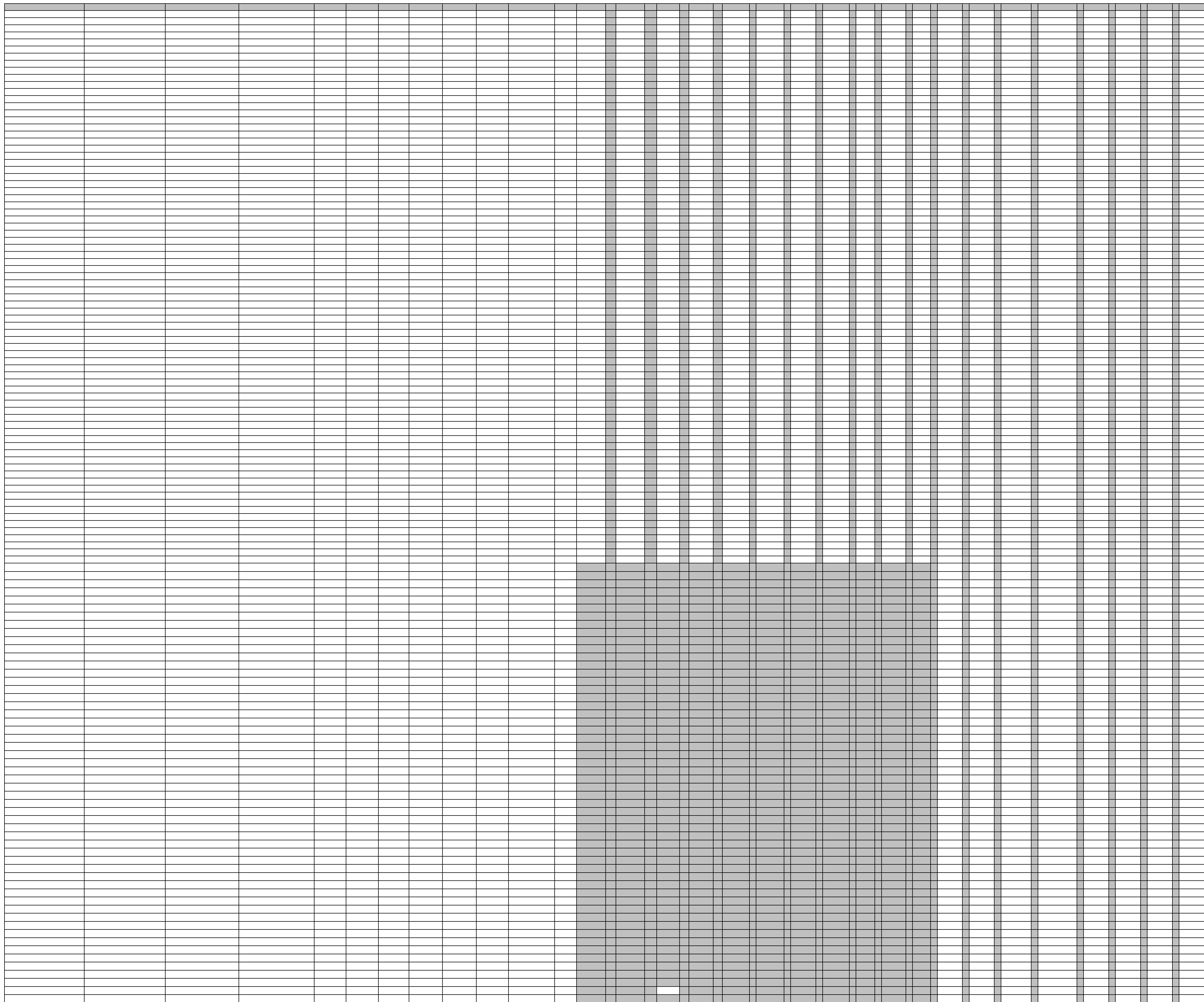
Object1	Object2	Similarity
Conductivity	Ca_Tot	0.982
Conductivity	Hardness	0.983

Conductivity	Mg_Tot	0.965
Conductivity	K	0.942
Conductivity	Chloride	0.932
Conductivity	Sulfate	0.941
Conductivity	TDS	0.986
Ca_Tot	Hardness	0.969
Ca_Tot	Mg_Tot	0.942
Ca_Tot	K	0.926
Ca_Tot	Chloride	0.916
Ca_Tot	Sulfate	0.927
Ca_Tot	TDS	0.971
Hardness	Mg_Tot	0.988
Hardness	K	0.924
Hardness	Chloride	0.931
Hardness	Sulfate	0.956
Hardness	TDS	0.992
Mg_Tot	K	0.924
Mg_Tot	Chloride	0.920
Mg_Tot	Sulfate	0.977
Mg_Tot	TDS	0.986
K	Chloride	0.920
K	Sulfate	0.907
K	TDS	0.940
Alkalinity	Bicarbonate	1.000
Chloride	TDS	0.932
Sulfate	TDS	0.971

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[illegible]

[illegible]



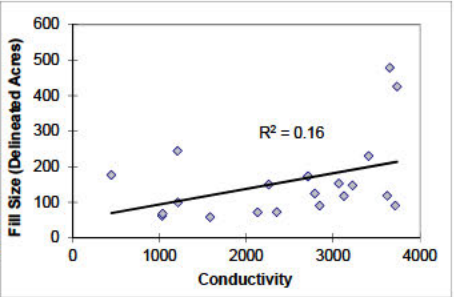
Stream Name	Azcoode	Fill Type	Vegetative Cover	Mining Type(s)	F/S at	F/Age	[Delrinde]	La/Deg	La/Tm	Lo/Deg	Lo/Tm	Conductiv	Tmp		Al Tot	Ca Tot	Cu	Hardness	Fe Tot	Mg Tot	Mn Tot	K	Se	Na	Zn	Alkalinity	Bicarbonate	Chloride	Sulfate	TDS	TSS						
S ick Rock Branch	WVBS7-2-AA	Bottom up	Small trees, scrub		17	132	37	38	62	3	1995	7.55	1																								
UNT8/cr Rock Branch RM 0.81	WVBS7-2-AA-1	Bottom up	Small trees, scrub		17	6.01	37	38	62	3	1192	8.01	11.9																								
UNT8/cr Rock Branch RM 0.82	WVBS7-2-AA-1	Bottom up	Small trees, scrub		17	32.28	37	38	62	3	1	72	6.26	12.35																							
UNT8/g Munny Branch RM 0.9	WVBS7-2-CC-1	Bottom up	Small trees, scrub, grass		15	61.55	37	38	62	1	112	7.81	12.5																								
Pats Branch	WVBS7-0-E	Bottom up	Small trees, scrub, grass		1	8	2	37	38	62	5	1	8.12	15.5																							
UNT/Sycamore Fork RM 2.3	WWK-10-T-11-F-5	Bottom up - chimney core	Small trees, scrub			56.8	37	63	81	3	865	8.02	10.59																								
UNT/Sycamore Fork RM 2.38	WWK-10-T-11-F-6	Bottom up - chimney core	Small trees, scrub		1979	27	52.14	37	63	81	2	60.16	8.13	11.9																							
UNT/Skin Poplar Branch RM 2.53	WWK-10-T-11-G	Bottom up - chimney core	Large trees, small trees, grass on top		22	172.53	37	61	81	3	1175	7	1	11																							
Casey Creek	WWK-10-U-8	End dump	Small trees, scrub, grass		15	755.61	37	5	81	2	1	3	8.39	16.03																							
UNT/Casey Creek RM 3	0	End dump	Small trees, scrub, grass		15	9.26	37	5	81	2	1330	8.33	17.62																								
UNT/Mud Lick Fork RM 0.66	WWK-31-A-1	Bottom up	10 y trees		1997	38	302.01	38	61	2	333	6.8	16.01		0.02	395	0.003	2570	0.02	38	0.038	32.6	0.0211	12	0.006	59	59	0	1750	3090	2						
UNT/Song Fork RM 0.3	WWK-31-B-6	Bottom up	Small trees, scrub	(Buffs Creek Seam)	9	10	67	38	3	81	1391	6.1	13.35																								
UNT/Stolling Fork RM 1.02	WWK-31-I-2	Bottom up	Small trees, scrub	(Buffs Creek Seam)	9	10	85.39	38	3	81	3187	7.5	15.95		0.03	385	0.003	2680	0.15	17	0.089	27.5	0.0183	11.7	0.009	310	310	0	2020	3160	2						
UNT/Stolling Fork RM 1.27	WWK-31-K-3	Bottom up	Small trees, scrub (ess trees than 10 and 11)	(Buffs Creek Seam)	2000	9	81	38	3	81	2508	7.53	15.83																								
UNT/Leatherwood Creek RM 10.76	WKKE-5-J	End dump	Grass, small trees + arger th cker than VF	Augerung	2008	5	173.69	38	21	81	0	2712	6.23	13.88		2.17	29	0.009	2100	0.87	331	1	1	20.8	0.0095	5.8	0.83	79	79	0	1720	2580	11				
UNT/Peachorchard Branch RM 1.33	WWK-5-L-2	End dump	No vegetation	(Cannon thru Winfred)	2008	1	177.18	38	20	81	7.51	15.9																									
UNT/Peachorchard Branch RM 1.8	WWK-5-L-5	End dump	Rye grass on first three ft	Coalburg	2001	1	68.83	38	20	81	1032	6.71	13.9		0.2	101	0.003	590	0.57	83.1	0.783	11	0.006	3.2	0.11	76	76	10	177	270	77						
UNT/Peachorchard Branch RM 1.72	WWK-5-L-5	End dump	Barren, sparse grass	(Cannon thru Winfred)	2007	2	2	45			1205	7.02	1																								
UNT/Boardree Branch RM 0.57	WWK-5-M-1	End dump	No vegetation	Augerung	2007	2	58.25	38	19	81	1583	6.51	1.72																								
UNT/Boardree Branch RM 0.59	WWK-5-M-2	End dump	Grass (thin) w/ erois on it s	Augerung	1996	13	72.22	38	19	81	2	23	7	15.69		0.06	272	0.003	1800	1.77	271	3.2	16.9	0.002	5.9	0.005	305	305	20	1300	2050	2					
UNT/Boardree Branch RM 0.57	WWK-5-M-2	End dump	No vegetation	Augerung	1996	13	91.0	38	19	81	2	3712	7.1	15.61																							
Si House Branch	WWK-5-O	End dump	No vegetation	Augerung	1996	13	25.07	38	19	81	1	3736	7.7	15.56																							
UNT/Twenty/e Creek RM 17.18	WWK-5-P-7	End dump	Grass, very sparse small trees	(Cannon and Coalburg)	Auger (sm.	2008	1	150.3	38	20	3065	6.88	15.7		0.02	398	0.003	2	80	0.13	362	0.16	21.5	0.00	9	7.8	0.008	202	202	0	1990	2860	3				
UNT/Twenty/e Creek RM 17.20	WWK-5-P-5	End dump	Grass,sparse small trees	Augerung	2008	1	91	38	20	81	0	28	7.25	15.3																							
UNT/Twenty/e Creek RM 17.85	WWK-5-P-7	Bottom up	Grass, sparse trees, ots of exposed rock	Area Mountainop Contour Highwall	2005	125.38	38	20	80	59	2788	7.55	1																								
UNT/Robinson Fork RM 1.59	WWK-5-P-3	Bottom up	Grass (thin)	Area Mountainop	2	8	1	7.39	38	19	80	59	322	7.35	15	29																					
UNT/Robinson Fork RM 1.87	WWK-5-P-3	Bottom up	Grass, small trees	Area Mountainop	2	8	1	7.39	38	19	80	59	322	7.35	15	29																					
UNT/Robinson Fork RM 2.13	WWK-5-P-5	End dump	Grass, small trees, arger hardwoods on top	H gwall s and Deep (Beth eham)	1990/s	15	119.03	38	19	80	59	3621	7.6	15.18		0.0	09	0.003	3090	0.38	502	0.191	27.6	0.0057	9.7	0.011	232	232	0	2530	3590	3					
UNT/Robinson Fork RM 0.16	WWK-5-P-O-2	Bottom up	Grass	Area Mountainop	2005	117.80	38	19	81	0	3122	6.8	13.9																								
Spruce Run	WWK-5-Q	Bottom up	Grass, scrub, on recent splits planted	A ea Mountainop Contour Highwall	2002	7	230.32	38	20	80	59	3	09	6	7	15.15		0.03	00	0.003	2820	0.05	2	0.713	28.3	0.0068	10.2	0	0	8	225	225	0	2360	3	00	2
UNT/Twenty/e Creek RM 19.20	WWK-5-Q-3	Bottom up	Grass (thin)	Area Mountainop Contour Highwall	2006	38	150.11	38	20	80	56	2269	6.97	15.19		0.02	351	0.003	1810	0.32	177	0.02	18.5	0.0413	8	0.02	191	191	20	1330	2050	2					
UNT/Twenty/e Creek RM 22.80	WWK-5-Q-8	Bottom up	Grass, scrub, on over flts, grass on upper flts	A ea Mountainop Contour Highwall	1996	13	71.93	38	21	80	59	2127	7.09	13	7	0.61	176	0.003	1630	0.55	299	9.57	1	0.003	8	0.0323	18	18	20	1	90	1960					
UNT/Twenty/e Creek RM 23. 6	WWK-5-R-6	Bottom up Hybrid	Grass, scrub on over flts, grass on upper flts	Area Mountainop Contour Highwall	1999/s	15	99.92	38	22	80	55	1209	6.7	12.96																							
UNT/Ne Fork RM 0.86	WWK-5-R-1-A	Bottom up	Small trees	Area Mountainop	1990/s	15	99.99	38	20	80	56	1031	5	13.96		0.1	8	5	0.003	635	0.005	103	2.55	8.8	0.001	3	0.006	11	11	10	626	8	6	2			
Coppers Mine Fork	WWK-6-S-8	Bottom up Hybrid	Grass	Area Mountainop Contour Highwall	2003	6	169.78	37	8	82	7	9	7.91	12.81																							
UNT/Coppers Mine Fork RM 8.86	WWK-6-S-10	Bottom up Hybrid	Grass, sparse autumn o ive	Area Mountainop Contour Highwall	2003	7	117.35	37	8	82	7	107	7.32	12.81		0.13	118	0.003	660	0.75	88.8	0.07	6	0.00	8.8	0.005	230	230	10	368	781	22					
UNT/Coppers Mine Fork RM 8.9	WWK-6-S-11	Bottom up Hybrid	Grass	Area Mountainop Contour Highwall	2003	6	103.78	37	8	82	7	1031	7	13.18		0.03	117	0.003	621	0.52	79.9	0.1	7	0.0031	6.8	0.005	258	258	10	32	707	3					
UNT/Coppers Mine Fork RM 6.58	WWK-6-S-7	Bottom up	Grass, sparse trees	Area Mountainop Contour Highwall	2002	6	38	37	9	82	6	1289	7.6	12.9																							
UNT/Coppers Mine Fork RM 6.82	WWK-6-S-7-9	Bottom up	Grass (thin)	Area Mountainop Contour Highwall	2	7	119.5	37	9	82	6	1536	6	13.87		0.02	15	0.003	887	0.1	122	0.11	10.5	0.0188	1.7	0.005	3	3	20	5	9	1150	2				
UNT/Coppers Mine Fork RM 7.35	WWK-6-S-8	Bottom up	Grass (thin)	Area Mountainop Contour Highwall	2006	37	5	78	37	9	156	6.82	13.2																								
UNT/Left Fork RM 0.89	WWK-6-H-3-A	Bottom up	Barren, sparse grass	Area Mountainop	2006	1	50.3	37	3	82	26	7.32	18.2																								
UNT/Left Fork RM 1.31	WWK-6-H-3-B	Bottom up	Grass	Area Mountainop	2	2	101.35	37	3	82	67	6.57	1																								
UNT/Cow Creek RM 5.05	WWK-6-J-5	Bottom up	Grass	Area Mountainop	2	2	6.22	37	2	82	771	6.73	15.85																								
UNT/Bedford Hollow RM 1.31	WWK-6-K-5-O	Bottom up	Grass, scrub, 2yr trees on top	Area Mountainop	1	13	13	38	37	52	61	5	2168	7.8	13.88		0.0	199	0.003	1560	0.07	262	0	17.8	0.0087	6.9	0.005	55	55	20	975	1830	2				
UNT/Dongess Run RM 0.82	WWK-6-K-1	Bottom up	Grass	Area Mountainop Contour Highwall	200	5	112.70	37	51	81	53	1210	7.68	1	1	0.2	135	0.003	7	60	0	99.3	0.035	11	0.0377	5	0.005	181	181	20	6	91	7				
Conney Branch	WVWOG-6	End dump	Grass, sparse trees			1582.82	38	5	81	58	2297	6	1																								
UNT/Stanley Fork RM 2.38	WVWOG-6-S-5A	End dump	Grass, small trees			18.16	38	81	57	1	60	8.17	13	8																							
UNT/Stanley Fork RM 0.77	WVWOG-6-A	End dump	Small trees, scrub, grass			90.87	38	81	56	167	7.8	11	9																								
UNT/Ballard Fork RM 0.08	WVWOG-9-0-2A	End dump	Small trees			15	26.26	38	81	56	2228	7.58	5	1																							
UNT/Ballard Fork RM 0.18	WVWOG-9-0-3A	End dump	Grass, small trees			15	27	38	81	56	2133		21.9																								

SUMMARY OUTPUT

Regression Statistics				
Multiple R	0.402803			
R Square	0.16223			
Adjusted R	0.118158			
Standard E	104.1169			
Observatio	21			
ANOVA				
	df	SS	MS	F
Regression	1	39890.22	39890.22	3.679797
Residual	19	205966.3	10840.33	0.07022
Total	20	245856.3		
Coefficients				
	Coefficient	Standard Error	t Stat	P-value
Intercept	50.68212	60.68404	0.834851	0.414176
Conductivi	0.043737	0.0228	1.91828	0.070229

RESIDUAL OUTPUT

Observation	Size (Acre)	Residuals
1	95.75463	-33.7647
2	103.5388	-3.61978
3	143.6901	-71.7601
4	199.7603	30.52948
5	149.4633	0.646684
6	172.6	-47.22
7	187.2081	-69.2781
8	191.6692	-44.2792
9	169.1011	3.328907
10	209.0327	-90.0027
11	184.7151	-31.3351
12	175.0493	-84.0493
13	153.3996	-80.1796
14	210.3011	267.8489
15	213.0127	-121.973
16	214.0624	211.0076
17	69.99374	107.1863
18	119.8973	-61.6473
19	103.3648	141.2852
20	95.79839	-27.1684
21	169.276	4.41396



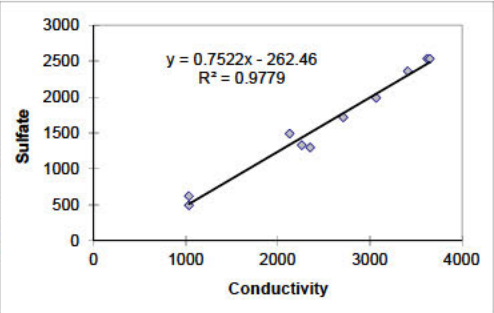
Conductivity	Sulfate
1031	626
2127	1490
3409	2390
2259	1330
3621	2530
3065	1990
2349	1300
3650	2530
1032	497
2712	1720

SUMMARY OUTPUT

Regression Statistics				
Multiple R	0.968904			
R Square	0.97793			
Adjusted R	0.975172			
Standard E	113.0764			
Observatio	10			
ANOVA				
	df	SS	MS	F
Regression	1	4694331	4694331	354.4877
Residual	8	105940.6	13242.58	
Total	9	4800272		
Coefficients				
	Coefficient	Standard Error	t Stat	P-value
Intercept	-262.452	107.263	-2.44684	0.040134
Conductivi	0.752229	0.039953	18.82784	6.52E-08

RESIDUAL OUTPUT

Observation	Size (Acre)	Residuals
1	513.0932	112.9068
2	1337.537	152.4634
3	2301.893	58.10534
4	1436.831	-106.831
5	2461.367	68.63271
6	2043.128	-93.1278
7	1504.532	-204.532
8	2483.182	46.81806
9	513.8454	-16.8454
10	1777.591	-57.5908



Date	Stream Name	Conductivity	Sulfate	X Location	Arco	Mile Point	X Location	Art III	VF #	Pond #	NPDES	Outlet #	Fill Start	Construction time	Fill Age	Construction Comment
9/2/2009	UNT/Ballard Fork RM 0.08	2228		At toe of valley fill	WVOG	0.030	At toe of valley fill								15	Big boulder channel with only small areas of exposed water.
9/2/2009	UNT/Ballard Fork RM 0.18	2133		At toe of valley fill	WVOG	0.050	At toe of valley fill								15	
9/2/2009	UNT/Stanley Fork RM 0.77	1674		At toe of valley fill	WVOG	0.060	At toe of valley fill				WV0099392?	028?				No undisturbed hw's in here.
9/2/2009	UNT/Stanley Fork RM 0.38	1460		At toe of valley fill	WVOG	0.030	At toe of valley fill									
9/2/2009	Connelly Branch	2297		At toe of valley fill	WVOG	0.120	At toe of valley fill									2.5 mile long fill.
9/2/2009	UNT/Sycamore Fork RM 2.88	603		At toe of valley fill	WVKC-	0.300	At toe of valley fill						1979		27	No pond on this one. Four foot lift chimney drain - bottom up with chimney core drain. 25-30 years old - built in 1979.
9/2/2009	UNT/Sycamore Fork RM 2.34	865		At toe of valley fill	WVKC-	0.100	At toe of valley fill									Fill constructed with chimney drain construction.
9/2/2009	UNT/Skin Poplar Branch Rm 2.53	1175		At toe of valley fill	WVKC-	0.500	At toe of valley fill								22	20 to 25 years old chimney drain fill with more newer material dumped on it more recently. Colony Bay Coal Company DEP Permit 5-7-81 NPDES - 0058238 - OF 001
9/2/2009	UNT/Casey Creek RM 3.40	1390		At toe of valley fill	WVKC-	0.000	At toe of valley fill								15	
9/2/2009	Casey Creek	1434		At toe of valley fill	WVKC-	3.490	At toe of valley fill								15	2.8 mile long fill and about 15 years old after reclaimed. This is a relatively big fill.
9/3/2009	UNT/Big Muncy Branch RM 0.94	1124		At toe of valley fill	WVBS	0.700	At toe of valley fill								15	Nice Wonder Coal Company bottom up fills. Haul down and fill then reclaim way back up. Reclaimed and done in mid 1990's. Highway construction on top as well for King Coal? Estimated about 300 million yard fill.
9/3/2009	UNT/Slick Rock Branch RM 0.81	1192		At toe of valley fill	WVBS	0.070	At toe of valley fill								17	
9/3/2009	UNT/Slick Rock Branch RM 0.82	1472		At toe of valley fill	WVBS	0.050	At toe of valley fill								17	
9/3/2009	Slick Rock Branch	1995		At toe of valley fill	WVBS	0.900	At toe of valley fill								17	This is the biggest fill of the ones on Slickrock.
9/3/2009	Pats Branch	1442		At toe of valley fill	WVBS	0.400	At toe of valley fill								14	Reclaimed in 1994 1995. Haul down and bottom up with 50 foot lifts. Total 14 lifts. 2 to 3 years to build. 700 ft elevation.
9/3/2009	UNT/Cow Creek RM 5.05	771		At toe of valley fill	WVOG-	0.100	At toe of valley fill								2	1 to 2 year old bottom up fill. Reclaimed fast. About 4 lifts and reclaimed about 2 years when they first started dumping. Done quick may make a difference. Active job here - about 8 to 9 bench lifts here.
9/3/2009	UNT/Left Fork RM 1.31	967		At toe of valley fill	WVOG-	0.100	At toe of valley fill								2	Quick fill here - 7 lifts to the top - will be 8 when done. Only about 2 years old.
9/3/2009	UNT/Left Fork RM 0.89	264		At toe of valley fill	WVOG-	0.100	At toe of valley fill								1	Newest fill in progress. 8 lifts to finish. Mined behind it completely. NPDES WV1020561 OF # 003.
10/6/2009	UNT/Copperas Mine Fork RM 8.86	1074	368	At toe of valley fill	WVOG-	0.100	At toe of valley fill	S-5017-96	4	3	WV1007939	003	2002	6mos. - 1 yr.		
10/6/2009	UNT/Copperas Mine Fork RM 9.46	1031	324	At toe of valley fill	WVOG-	0.100	At toe of valley fill	S-5017-96	5	4	WV1007939	004	2003	6mos. - 1 yr.		Bottom 2 lifts built first then end-dump on top of them.
10/6/2009	Copperas Mine Fork	940		At toe of valley fill	WVOG-	9.500	At toe of valley fill	S-5017-96	6	4	WV1007939	004	2003	6mos. - 1 yr.		Bottom 2 lifts built first then end-dump (insp.-"lots of pushing").
10/6/2009	UNT/Copperas Mine Fork RM 7.35	1564		At toe of valley fill	WVOG-	0.100	At toe of valley fill	S-5084-86	4	4	WV0092649	004	2006	3.5 yrs.		Most fill in place for long time, but just recently finished.
10/6/2009	UNT/Copperas Mine Fork RM 6.92	1536	549	At toe of valley fill	WVOG-	0.500	At toe of valley fill	S-5084-86	3	3	WV0092649	003	2001/2002	5 yrs.		
10/6/2009	UNT/Copperas Mine Fork RM 6.58	1289		At toe of valley fill	WVOG-	0.200	At toe of valley fill	S-5084-86	2	2	WV0092649	002	2003/2004	<1 yr.		
10/6/2009	UNT/Dingess Run RM 4.82	1210	464	At toe of valley fill	WVOG-	0.200	At toe of valley fill	S-5013-90	B	2	WV1010689	002	2004	5+ yrs.		Not yet finished (90% complete) Active placement on top.
10/6/2009	UNT/Ethel Hollow RM 0.41	2193	975	At toe of valley fill	WVOG-	0.350	At toe of valley fill	S-5024-93	1		WV1010689	029	2000/2001	5 yrs.		4 lifts built quick, slow thereafter; Insp. - "Very good fill construction - probably as good as it gets" .
10/6/2009	UNT/Mudlick Fork RM 0.66	3331	1750	At toe of valley fill	WVKC-	0.200	At toe of valley fill	S-5057-92	3		WV1013441	003	1997	3 yrs.		3 lifts built quick, slow thereafter and open on top for long time.
10/6/2009	UNT/Stolling Fork RM 0.63	1391		At toe of valley fill	WVKC-	0.100	At toe of valley fill	S-5057-92			WV1013441	004	1998/1999	<1 yr.		
10/6/2009	UNT/Stolling Fork RM 1.02	3187	2020	At toe of valley fill	WVKC-	0.050	At toe of valley fill	S-5057-92			WV1013441	005	1998/1999	<1 yr.		
10/6/2009	UNT/Stolling Fork RM 1.27	2508		At toe of valley fill	WVKC-	0.100	At toe of valley fill	S-5057-92			WV1013441	006	2000	<1 yr.		Fill built quick, but left open on top for long time.
Date	Stream Name	Conductivity	Sulfate	X Location	Arco	Mile Point	X Location	Art III	VF #	Pond #	NPDES	Outlet #	Fill Start	Construction time	Fill Age	Construction Comment
10/7/2009	UNT/Neff Fork RM 0.86	1031	626	At toe of valley fill	WVKG-	0.300	At toe of valley fill	S-3005-90	B		WV0096598	012	Early 1990's	2 yrs.		
10/7/2009	UNT/Twentymile Creek RM 23.46	1209		At toe of valley fill	WVKG-	0.200	At toe of valley fill	S-3021-93	8		WV1014587	033	1993-1994	See comment		First couple of lifts built quick but top three lifts were end dumped circa 2005/2006.
10/7/2009	UNT/Twentymile Creek RM 22.80	2127	1490	At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-3021-93	7		WV1014587	035 or 036?	1996	See comment		First couple of lifts built quick, new material (Coalburg overburden) added on top and new haul built up face circa 2005/2006.
10/7/2009	Spruce Run	3409	2360	At toe of valley fill	WVKG-	0.500	At toe of valley fill	S-3005-98	G		WV1015362	012	2002	Not yet finished		Generally reclaimed 2007 but influenced by road and still disturbed on top.
10/7/2009	UNT/Twentymile Creek RM 19.20	2259	1330	At toe of valley fill	WVKG-	0.030	At toe of valley fill	S-3005-98	H		WV1015362	015	2006	Not yet finished		Almost finished; insp. - "top notch fill construction"; fill comprised entirely of Coalburg to Stockton materials - 5-Block overburden disposed in back of Fill G; fill is "overstacked".
10/7/2009	UNT/Twentymile Creek RM 17.85	2788		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-3005-98	F		WV1015362	001	2005	1 yr.		Insp.- "good fill construction".
10/7/2009	UNT/Robinson Fork RM 0.16	3122		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-3005-98	D		WV1015362	006	2005	2 yrs.		
10/7/2009	UNT/Robinson Fork RM 1.59	3224		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-3005-98	C		WV1015362 or WV	003 or 010	2001/2002	Not yet finished		Mostly constructed w/in 1 year but remains unreclaimed on top and is influenced by a haul road.
10/7/2009	UNT/Robinson Fork RM 1.87	2708		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-3005-98	B		WV1015362	002	1999/2000	3 yrs.		Reclaimed except very top where there is a haul road.
10/7/2009	UNT/Robinson Fork RM 2.13	3621	2530	At toe of valley fill	WVKG-	0.200	At toe of valley fill	S-3013-91	A1		WV1012401	004	Early 1990's	See comment		Reclaimed by Bethlehem 1995, but two lifts added by Alex and finished 1998.
10/13/2009	UNT/Twentymile Creek RM 17.18	3065	1990	At toe of valley fill	WVKG-	0.200	At toe of valley fill	S-2009-95	3		WV1014005	035	1996/1997	7 yrs.		Road across fill.
10/13/2009	UNT/Twentymile Creek RM 17.20	2844		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-2011-99	4		WV1018001	007	2003	2 yrs.		Road across fill.
10/13/2009	UNT/Boardtree Branch RM 0.57	2349	1300	At toe of valley fill	WVKG-	0.000	At toe of valley fill	S-2009-95	1 (a)		WV1014005	024	1996	Not yet finished		Permitted as one large fill but 3 distinct fills exist (DWWM classified as a,b,c); this one almost reclaimed.
10/13/2009	Boardtree Branch	3650	2530	At toe of valley fill	WVKG-	0.600	At toe of valley fill	S-2009-95	1 (b)		WV1014005	024	1996	Not yet finished		Permitted as one large fill but 3 distinct fills exist (DWWM classified as a,b,c); this one partially reclaimed, terraced.
10/13/2009	UNT/Boardtree Branch RM 0.59	3712		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-2009-95	1 (c)		WV1014005	024	1996	Not yet finished		Permitted as one large fill but 3 distinct fills exist (DWWM classified as a,b,c); this one under construction.
10/13/2009	Stillhouse Branch	3736		At toe of valley fill	WVKG-	0.500	At toe of valley fill	S-2009-95	2		WV1014005	029	1996	Not yet finished		Have been dumping in this fill continuously since 1996, not reclaimed,just dumped. Assumed it would be high conductance-wise as a result.
10/13/2009	Peachorchard Branch	442		At toe of valley fill	WVKG-	1.800	At toe of valley fill	S-2013-98	3		WV1017969	003	2008	Not yet finished		Active end-dumping; no lifts constructed.
10/13/2009	UNT/Peachorchard Branch RM 1.72	1583		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-2013-98	2		WV1017969	002	2007	Not yet finished		2 lifts established, 4 more to come.
10/13/2009	UNT/Peachorchard Branch RM 1.48	1205		At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-2013-98	1		WV1017969	001	2007	Not yet finished		2 lifts established, 3 more to come more reclamation than VFs 2 and 3.
10/13/2009	UNT/Peachorchard Branch RM 1.33	1032	497	At toe of valley fill	WVKG-	0.100	At toe of valley fill	S-2013-98	4		WV1017969	004	2008	Not yet finished		First 3 lifts recently reclaimed with active disturbance on top, 2 more lifts to come.
10/13/2009	UNT/Leatherwood Creek RM 10.76	2712	1720	At toe of valley fill	WVKE-	0.700	At toe of valley fill	S-2011-99	5		WV1018001	024	2004	1 yr.		Road across fill.

Fill Size (General)	Fill Size (Delineated Acres)	Vegetative Cover	Fill Type	Mining Type(s)	General Field Comments
Small	26.2	Small trees	End dump		Relatively speaking, small fill. Thickly vegetated, shrubby scrub volunteer species.
	27.0	Grass, small	End dump		Fill #26??
	89.7	Small trees	End dump		Simmons thinks Stanley fills are older than Ballard fills. Stanley Fork mainstem upstream of this fill has conductivity of 2240. WV0099392 OF 028
	18.2	Grass, small	End dump		
Very large	1582.8	Grass, sparse trees			
	52.2	Small trees	Bottom up - chimney core		Chimney core drain has a lot of space - can see stream.
	56.8	Small trees	Bottom up - chimney core		Site was about 15 meters below the toe of fill.
	172.5	Large trees	Bottom up - chimney core		
	149.3	Small trees	End dump		
Large	755.6	Small trees	End dump		Calcite armouring on streambed at this location. DS of toe about 0.4 miles.
	61.6	Small trees	Bottom-up		
	45.0	Small trees, scrub			DS of western fill face
	32.3	Small trees, scrub			DS of eastern fill toe
	132.0	Small trees, scrub			
	84.2	Small trees	Bottom up		
	64.0	Grass	Bottom-up		
	101.4	Grass			
	50.3	Barren, sparse grass			
	117.35	Grass, sparse	Bottom-up	Area Mountaintop + Contour Highwall	
	63.83	Grass	Bottom-up Hyb	Area Mountaintop + Contour Highwall	Strong Fe staining/precipitate in channel between toe and pond - common pond and outlet for VFs 5 and 6.
	109.78	Grass	Bottom-up Hyb	Area Mountaintop + Contour Highwall	Site is actually about 75 m ds of the toe of valley fill. Strong Fe staining/precipitate in channel between toe and pond; common pond and outlet for VFs 5 and 6.
	54.78	Grass (thin)	Bottom-up	Area Mountaintop + Contour Highwall	Strong Fe staining/precipitate in channel between toe and pond; Small coal seam just above pond elevation - sampled above and below.
	119.5	Grass (thin)	Bottom-up	Area Mountaintop + Contour Highwall	Flow much greater than 10/6/09 sites 1-4; not Fe stained like 4; may be influenced by old deep mine
	43.8	Grass, sparse	Bottom-up	Area Mountaintop + Contour Highwall	No Fe staining. Site is actually about 30 meters ds from the toe.
	112.79	Grass	Bottom-up	Area Mountaintop + Contour Highwall	
Very large	134.58	Grass, scrub	Bottom-up	Area Mountaintop	Fill includes spoil hauled back from Ana Branch; Site is actually about 40 meters ds of the toe - but above the pond.
Large	302.01	10 yr trees	Bottom-up		Additional large source - flowing out of right hillside of pond - (calcified waterfall and landing).
Small	44.67	Small trees	Bottom-up	Area Mountaintop + Contour Highwall (Buffalo Creek Seam)	
Small	85.39	Small trees	Bottom-up	Area Mountaintop + Contour Highwall (Buffalo Creek Seam)	
Small	81.44	Small trees	Bottom-up	Area Mountaintop + Contour Highwall (Buffalo Creek Seam)	
Fill Size (General)	Fill Size (Delineated Acres)	Vegetative Cover	Fill Type	Mining Type(s)	General Field Comments
Small - Mediu	61.99	Small trees	Bottom-up	Area Mountaintop	Coal dips toward fill; Slight fe channel staining at toe; Strong Mn staining in channel below pond; fill discharge may be influenced by deep mines. Pond is a fair distance downstream.
Small - Mediu	99.92	Grass, scrub	Bottom-up Hyb	Area Mountaintop + Contour Highwall	Coal dips away from fill; Strong fe channel staining at toe; more flow than 10/7/09 Site 1; fill discharge may be influenced by deep mines.
Small - Mediu	71.93	Grass, scrub	Bottom-up	Area Mountaintop + Contour Highwall	Strong iron staining - Although VFs 7 and 8 of this permit are similar in many aspects, Conductivity is twice as high in discharge from VF7. Site is actually about 200 meters downstream of toe of fill but still above the pond.
Medium	230.32	Grass, scrub	Bottom-up	Area Mountaintop + Contour Highwall	Coal dips toward fill and flow is strong; no channel staining at toe but algae present; pond is crystal clear.
Very large	150.11	Grass (thin)	Bottom-up	Area Mountaintop + Contour Highwall	Flow low for fill size; Stream site is about 2 foot wide and about 6 inches deep where sampled.
Medium	125.38	Grass, sparse	Bottom-up	Area Mountaintop + Contour Highwall	Coal dips toward fill; high flow; strong Mn channel staining at toe. Fairly heavy flow and clear water.
Medium	117.93	Grass	Bottom-up	Area Mountaintop	Even though no contour mining waste placed in fill, may still be influenced by because fill is down-dip - algae in channel below toe. Small 1 foot wide ditch and about 3 inches deep. Large fill.
Medium	147.39	Grass (thin)	Bottom-up	Area Mountaintop	Coal dipping away - on strike. About 3 foot wide channel and about 2 inches deep. Moderate flow today. Fill not finished.
Medium - Larg	172.43	Grass, small	Bottom-up	Area Mountaintop	May be influenced by deep mining - two discharges at toe, one clear, one orange, both sampled. There were two discharges coming out of this fill about 10 feet apart - one Fe stained and the other not. No appreciable difference in field conductance or pH.
Large	119.03	Grass, small	End-dump	Area Mountaintop (Alex) + Contour Highwall and	Heavy Fe staining and precipitate. Fe staining heavy. About 2 foot wide and 3 inches deep in channel. Moderately high flow today.
Small	153.38	Grass, very sparse	End-dump or "n	Area MTM (5-block)+ HW Contour (Clarion and Co	Large sediment delta between fill and pond; influent has grayish color and pond is murky with much sediment despite two check dams between toe and pond; slight mn staling; flow heavy for small fill.
Small	91	Grass, sparse	End-dump	Area Mountaintop + Contour Highwall +Augering	Sampled below first check dam - flow high for fill size, but coal dips away - Mn and periphon heavy.
Very small	73.22	Grass (thin)	End-dump	Area Mountaintop + Contour Highwall +Augering	Common pond and outlet for all three fills; lots of sediment; Fe staining and heavy Mn precipitate in channel.
Medium - Larg	478.15	No vegetatio	End-dump	Area Mountaintop + Contour Highwall +Augering	Common pond and outlet for all three fills; lots of sediment; No metals staining/precipitate but algae present in channel; very different sizes between b and c yet conductance similar and distinct from a.
Very small	91.04	No vegetatio	End-dump	Area Mountaintop + Contour Highwall +Augering	Common pond and outlet for all three fills; lots of sediment; No metals staining/precipitate; very different sizes between b and c yet cond similar and distinct from a.
Medium - Larg	425.07	No vegetatio	End-dump	Area Mountaintop + Contour Highwall +Augering	Very high flow; strong Fe and Mn staining /precipitate w/fusing of substrate.
Small - Mediu	177.18	No vegetatio	End-dump	Multi-seam Highwall + point removal (Clarion thru	Only 1/4 of approved yardage has been placed in fill, near head; Pond is milky green/blue color; Although approved to HW mine Clarion/Coalburg/Winfred, only Clarion waste in fill; study potential because of different conductivities (this vs. VF2). Water quality site is actually not at toe but
Very small	58.25	Barren, spar	End-dump	Multi-seam Highwall + point removal (Clarion thru	Pond has tea color and is 1/3 covered w/brown foam/algae; No staining in channel; study potential because of different conductivities (this vs. VF3)
Small - Mediu	244.65	Grass	End-dump	Multi-seam Highwall (Clarion thru Coalburg)	Some of same pond scum as VF 2 but nowhere near as much. Drip treatment above - not dripping today. Small fill- contour mined and no mountain top mining.
Very small	68.63	Rye grass on	End-dump	Multi-seam Highwall (Clarion thru Coalburg)	Fill is in very narrow hollow; small flow; coal dips away; no metals staining but a lot of sediment; pond is milky.
Small	173.69	Grass, small	End-dump	Area Mountaintop + Contour Highwall +Augering	Coal dips toward fill and flow is high for fill size; Al precipitate and foam in channel, aquafix wheel for Mn treatment below toe sample point; also sampled pond influent where pH much higher and conductance about the same as toe.

	LatDeg	LatMin	LatSec	LonDeg	LonMin	LonSec	Conductivity	pH	Temp	Q	Al_Tot	Q	Ca_Tot	Q	Cu	Q	Hardness	Q	Fe_Tot	Q
	38	4	24.8	81	56	53.5	2228	7.58	14.51											
	38	4	21.8	81	56	46.9	2133		21.90											
	38	4	57.5	81	56	44.5	1674	7.80	14.84											
	38	4	59.62	81	57	11.88	1460	8.17	13.48											
	38	5	16.6	81	58	4.5	2297	6.41												
	37	53	23.6	81	42	40.6	603	8.13	11.19											
	37	53	50.9	81	43	4.3	865	8.02	10.59											
	37	51	23.1	81	43	13.2	1175	7.41	11.44											
	37	54	16.3	81	42	12.7	1390	8.33	17.62											
	37	54	11.6	81	42	13.2	1434	8.39	16.03											
	37	38	1.6	82	1	56.8	1124	7.81	12.54											
	37	38	27.8	82	3	47	1192	8.01	11.90											
	37	38	28	82	3	44.91	1472	8.26	12.35											
	37	38	30.5	82	3	35.2	1995	7.55	14.34											
	37	38	10.3	82	5	9.2	1442	8.12	15.50											
	37	42	52.4	82	4	2.3	771	6.73	15.85											
	37	43	9.8	82	4	34.4	967	6.57	14.49											
	37	43	30.7	82	4	14.3	264	7.32	18.24											
	37	48	54.3	82	7	39	1074	7.32	14.55		0.13	118	<	0.003		660		0.75		
	37	48	37.5	82	7	9.4	1031	7.00	13.18		0.03	117	<	0.003		621		0.52		
	37	48	37.8	82	7	6.1	940	7.91	12.81											
	37	49	38.1	82	7	15.1	1564	6.82	13.25											
	37	49	21.8	82	6	54	1536	6.45	13.87		0.02	154	<	0.003		887		0.1		
	37	49	34.4	82	6	23.3	1289	7.64	12.94											
	37	51	42.7	81	53	52.1	1210	7.68	14.92		0.2	135	<	0.003		746		0.49		
	37	52	31.5	81	54	37.6	2193	7.84	15.86		0.04	199	<	0.003		1580		0.07		
	38	3	38.2	81	42	47.6	3331	6.64	16.01	<	0.02	395	<	0.003		2570	<	0.02		
	38	3	17.7	81	43	16.9	1391	8.14	13.35											
	38	3	26.8	81	43	33	3187	7.54	15.95		0.03	385	<	0.003		2680		0.15		
	38	3	32.3	81	43	50.3	2508	7.53	15.83											
	LatDeg	LatMin	LatSec	LonDeg	LonMin	LonSec	Conductivity	pH	Temp	Q	Al_Tot	Q	Ca_Tot	Q	Cu	Q	Hardness	Q	Fe_Tot	Q
	38	20	50.7	80	56	20.8	1031	5.45	13.56		0.14		84.5	<	0.003		635		0.05	
	38	22	0.3	80	55	47.1	1209	6.70	12.96											
	38	21	38.4	80	56	22.6	2127	7.09	13.47		0.61		176	<	0.003		1630		0.55	
	38	20	14.3	80	59	22.2	3409	6.47	15.15		0.03		400	<	0.003		2820		0.05	
	38	20	40.3	80	58	58.2	2259	6.70	12.19		0.02		351	<	0.003		1610	<	0.02	
	38	20	13.8	80	59	58.2	2788	7.55	14.09											
	38	19	32.5	81	0	55.6	3122	6.84	13.39											
	38	19	29.2	80	59	53.9	3224	7.35	15.29											
	38	19	27.3	80	59	33.1	2708	7.82	14.94											
	38	19	10.3	80	59	19.5	3621	7.60	15.18		0.04		409	<	0.003		3090		0.38	
	38	20	26.9	81	0	57.2	3065	6.88	15.25		0.02		398	<	0.003		2480		0.13	
	38	20	25.2	81	0	40.5	2844	7.25	15.34											
	38	19	49.8	81	2	33.5	2349	7.49	15.69		0.06		272	<	0.003		1800		1.77	
	38	19	50.4	81	2	30.6	3650	6.66	15.70		0.04		405	<	0.003		2970		0.1	
	38	19	49.7	81	2	28.6	3712	7.10	14.51											
check dams in between. Not much mined - Coalburg only small section. Nothing done for the last 6 months.	38	19	48.2	81	1	28.2	3736	7.47	15.56											
	38	19	54.6	81	4	15.2	442	7.51	15.40											
	38	19	59.7	81	4	14.6	1583	6.51	14.72											
	38	20	8.8	81	4	0.1	1205	7.02	14.49											
	38	20	5.1	81	3	44.7	1032	6.71	13.94		0.24		101	<	0.003		594		0.57	
	38	21	7.6	81	0	6.8	2712	6.23	13.88		2.17		294		0.009		2100		0.87	

[illegible]

Date	Time	Stream Name	Ancode	Mile Point
9/2/2009	9:01	Ballard Fork	WVOGM-49	0.000
9/2/2009	9:12	UNT/Ballard Fork RM 0.08	WVOGM-49-0.2A	0.010
9/2/2009	9:44	UMT/Ballard Fork RM 0.18	WVOGM-49-0.3A	0.030
9/2/2009	9:55	UNT/Ballard Fork RM 0.33	WVOGM-49-0.5A	0.040
9/2/2009	10:25	UNT/Stanley Fork RM 0.77	WVOGM-48-A	0.010
9/2/2009	11:08	Discharge to Connelly Branch	WVOGM-46-{0.11}-Discharge	0.110
9/2/2009	12:58	Sycamore Fork	WVKC-10-T-11-F	2.900
9/2/2009	13:25	Discharge into Sycamore Fork	WVKC-10-T-11-F-{1.23}-Discharge	1.230
9/2/2009	14:58	Casey Creek	WVKC-10-U-8	3.370
9/2/2009	14:59	Casey Creek	WVKC-10-U-8	3.410
9/3/2009	11:02	UNT/Big Muncy Branch RM 0.94	WVBST-24-CC-1	0.140
9/3/2009	11:05	UNT/Big Muncy Branch RM 0.94	WVBST-24-CC-1	0.000
9/3/2009	12:19	Slick Rock Branch	WVBST-24-AA	0.750
9/3/2009	12:26	Slick Rock Branch	WVBST-24-AA	0.680
9/3/2009	15:23	UNT/Pine Creek RM 5.61	WVOG-65-H-4	0.000
9/3/2009	16:25	UMT/Left Fork RM 0.89	WVOG-65-H-3-A	0.000
10/6/2009	10:00	UNT/Copperas Mine Fork RM 8.86	WVOG-65-B-10	0.050
10/6/2009	11:25	UMT/Copperas Mine Fork RM 7.35	WVOG-65-B-8.4	0.090
10/6/2009	11:25	UMT/Copperas Mine Fork RM 7.35	WVOG-65-B-8.4	0.000
10/6/2009	12:00	UNT/Copperas Mine Fork RM 6.92	WVOG-65-B-7.9	0.400
10/6/2009	15:30	UNT/Mudlick Fork RM 0.66	WVKC-31-H-1	0.000
10/6/2009	17:05	UNT/Stolling Fork RM 1.02	WVKC-31-I-2	0.000
10/13/2009	10:30	UNT/Twenty mile Creek RM 17.18	WVKG-5-P.4	0.100
10/13/2009	11:30	UNT/Leatherwood Creek RM 10.76	WVKE-46-J	0.600
10/13/2009	12:50	Boardtree Branch	WVKG-5-M	0.100
10/13/2009	13:40	Twenty mile Creek	WVKG-5	15.500
10/6/2009	16:05	Discharge into UNT/Mudlick Fork RM 0.66	WVKC-31-H-1-0.11-Mine	0.11-Mine

X Location	Art III	VF #	Pond #	NPDES
At mouth, below several fills				
DS pond below fill				
DS pond below fill				
DS mining; no fill				
DS pond below fill				
US pond below fill - east corner drainage				
DS of several fills - above confluence of UNT/Sycamore Fork RM 3.9. Fills are about 0.4 miles upstream				
Treatment pump site on Sycamore ponds				
DS upper pond below Casey fill and UNT/Casey Creek RM 3.40 fill				
DS valley fill (about 700 m ds of toe)				
US pond ds fill face about 0.5 miles				
DS pond spillway below fill face about 0.61 miles				
DS of Slick Rock fill and UNT/Slick Rock RM 0.81 fills above wetland / pond				
DS of Slick Rock fill and UNT/Slick Rock RM 0.81 fills and ds wetland				
DS mining; no fill				
DS pond and fill				
DS Pond and Valley Fill				
Below fill; just US pond				
DS fill and pond, at outlet pipe on concrete spillway				
DS pond and fill				
At mouth DS valley fill and pond				
At mouth DS of valley fill and pond				
DS fill and pond, at outlet pipe on concrete spillway				
DS fill and US pond				
near mouth and below all fills				
US Stillhouse Branch				
Discharging from hillside on left descending side of toe pond.				

[illegible]

General Comments (JB)

(b) (5)

LatDeg	LatMin	LatSec	LonDeg	LonMin	LonSec	Conductivity	pH	Temp	Q	Al_Tot	Q	Ca_Tot	Q	Cu	Q	Hardness	Q	Fe_Tot	Q
38	4	24.1	81	56	59.1	1797	8.07	15.90											
38	4	24.31	81	56	54.27	1530	7.67	21.80											
38	4	21.5	81	56	48.2	2034	7.60	22.90											
38	4	18	81	56	39.8	2498	7.33	16.16											
38	4	57.15	81	56	47.47	1450	7.80												
38	5	17	81	58	3.99	2362	6.46	15.54											
37	53	24.5	81	43	0.3	630	8.36	15.32											
37	53	49.4	81	44	14.8	2330	7.45	20.50											
37	54	17	81	42	14.5	1408	8.21												
37	54	15.4	81	42	13	1423	8.33												
37	38	27.9	82	1	59.2	690	8.03	14.61											
37	38	33.8	82	2	0	452	7.99												
37	38	32.7	82	3	46.2	1807	8.40	14.66											
37	38	36.9	82	3	47.7	1795	8.37	15.77											
37	44	10.9	82	4	29.4	457	8.07	16.93											
37	43	31.7	82	4	17.7	236	9.35	25.12											
37	48	58.1	82	7	37	979	7.56	14.55											
37	49	38.75	82	7	15.1	1497	7.80	13.09											
37	49	42.12	82	7	15.18	1180	7.96	NA											
37	49	28	82	6	53.3	1317	7.59	15.12											
38	3	35.1	81	42	36.1	3209	7.96	17.97											
38	3	24.4	81	43	33.7	3213	7.78	16.26											
38	20	22.4	81	0	51	2749	7.89	15.43											
38	21	12.3	81	0	7.1	2640	9.61	14.13											
38	19	22.56	81	2	38.38	3777	8.24	15.26											
38	19	27.4	81	1	36.4	1881	7.52	14.27											
38	3	38.4	81	42	43.5	3944	8.25	15.94		0.02		503	<	0.003		3500	<	0.02	

[illegible]

[illegible]

Stefania
Shamet/R3/USEPA/US
12/27/2010 08:48 AM

To Greg Pond
cc John Forren, Margaret Passmore, Matthew Klasen
bcc
Subject Re: Draft answer to 215-216

(b) (5)

Hoping to hit macros on Wed. or so. (b) (6)

Greg Pond

Stef, here are some responses suitable for 215 a...

12/27/2010 07:24:59 AM

From: Greg Pond/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Date: 12/27/2010 07:24 AM
Subject: Draft answer to 215-216

Stef, here are some responses suitable for 215 and 216.

(b)
(5)

[Redacted text block]

[Redacted text block]

(b) (5)



Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov
Website: <http://epa.gov/reg3esd1/3ea50.htm>

Louis
Reynolds/R3/USEPA/US
12/27/2010 09:51 AM

To: Greg Pond
cc
bcc
Subject: Re: Fw: Draft answer to 215-216

Nice.

Lou Reynolds
USEPA Region III
Freshwater Biology Team
1060 Chapline St. Ste. 303
Wheeling, WV 26003-2995
P 304-234-0244
F 304-234-0260

Greg Pond

(b) (5)

12/27/2010 09:20:57 AM

From: Greg Pond/R3/USEPA/US
To: Louis Reynolds/R3/USEPA/US@EPA
Date: 12/27/2010 09:20 AM
Subject: Fw: Draft answer to 215-216

(b) (5)

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
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(p) 304-234-0243
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pond.greg@epa.gov

Website: <http://epa.gov/reg3esd1/3ea50.htm>

----- Forwarded by Greg Pond/R3/USEPA/US on 12/27/2010 09:18 AM -----

From: Greg Pond/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Date: 12/27/2010 07:24 AM
Subject: Draft answer to 215-216

Stef, here are some responses suitable for 215 and 216.

(b)
(5)

(b) (5)

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

U.S. EPA Region 3
1060 Chapline Street, Suite 303
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pond.greg@epa.gov
Website: <http://epa.gov/reg3esd1/3ea50.htm>

Matthew
Klasen/DC/USEPA/US
12/27/2010 10:23 AM

To "Christopher Hunter"
cc
bcc
Subject Fw: Spruce -- (b) (5)

Hey Chris,

FYI below on some of the Se questions. Do you want me to loop you into these discussions of the RD comments?

I'm happy to take the lead on compilation and making sure this part gets done, but want to make sure you're in the loop and participating as much as makes sense.

Let me know -- thanks.

-Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
Matthew Klasen

----- Original Message -----

From: Matthew Klasen
Sent: 12/27/2010 10:19 AM EST
To: Stefania Shamet; David Kargbo; John Forren; Margaret Passmore; Frank Borsuk; Louis Reynolds
Cc: David Rider
Subject: Re: Spruce -- (b) (5)

Hi Stef,

I just went through the consolidated comment draft I have, and you've hit all the responses we have on these comments.

(b) (5)

I'll plan to send things to OST this afternoon or early tomorrow, if we've still got some gaps.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
Stefania Shamet

----- Original Message -----

From: Stefania Shamet
Sent: 12/27/2010 09:37 AM EST
To: David Kargbo; Matthew Klasen; John Forren; Margaret Passmore; Frank Borsuk; Louis Reynolds
Cc: David Rider
Subject: Spruce -- (b) (5)

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

Christopher
Hunter/DC/USEPA/US
12/27/2010 11:40 AM

To: Matthew Klasen
cc
bcc
Subject: Re: Fw: Spruce -- (b) (5)

Thanks Matt,
I doubt I'll have much to add on these discussions, way too technical for me. Where I would like to be involved is making sure the final answers get incorporated into the FD text, as appropriate. That's what I've been doing this morning for the PD responses.

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

-----Matthew Klasen/DC/USEPA/US wrote: -----

To: "Christopher Hunter" <Hunter.Christopher@epamail.epa.gov>
From: Matthew Klasen/DC/USEPA/US
Date: 12/27/2010 10:23AM
Subject: Fw: Spruce -- (b) (5)

Hey Chris,

FYI below on some of the Se questions. Do you want me to loop you into these discussions of the RD comments?

I'm happy to take the lead on compilation and making sure this part gets done, but want to make sure you're in the loop and participating as much as makes sense.

Let me know -- thanks.

-Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229

Matthew Klasen

----- Original Message -----

From: Matthew Klasen
Sent: 12/27/2010 10:19 AM EST
To: Stefania Shamet; David Kargbo; John Forren; Margaret Passmore; Frank Borsuk; Louis Reynolds
Cc: David Rider
Subject: Re: Spruce -- (b) (5)

[REDACTED]

Hi Stef,

I just went through the consolidated comment draft I have, and you've hit all the responses we have on these comments.

(b) (5)

[REDACTED]

[REDACTED]

I'll plan to send things to OST this afternoon or early tomorrow, if we've still got some gaps.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229

Stefania Shamet

----- Original Message -----

From: Stefania Shamet
Sent: 12/27/2010 09:37 AM EST
To: David Kargbo; Matthew Klasen; John Forren; Margaret Passmore; Frank Borsuk; Louis Reynolds
Cc: David Rider
Subject: Spruce -- (b) (5)

[REDACTED]

(b) (5)

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)



Julia McCarthy/R8/USEPA/US

To Christopher Hunter

12/27/2010 04:15 PM

cc

bcc

Subject Spruce appendix 5


Chris,

Here's the "combed" version of appendix 5. There are a couple things that I couldn't change - the y axis of figure 5.4., as well as the font/size in Tables 5.2 and 5.3. (changing the font size kept freezing up my computer). Other than that, I think I addressed all the comments.

Cheers,

Julia

Julia McCarthy (on detail)
Life/Environmental Scientist
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Wetlands Division
Washington, DC
(202) 566-1660
mccarthy.julia@epa.gov

Success is like wrestling a gorilla. You don't quit when you're tired. You quit when the gorilla is tired. ~Robert Strauss  - Appendix 5 Cumulative Impacts 122110.doc

ATTACHMENT REDACTED - DELIBERATIVE

**Matthew
Klasen/DC/USEPA/US**
12/27/2010 04:36 PM

To Gregory Peck
cc
bcc
Subject Mitigation responses

Here's what we have so far. As noted in the key, focus on editing the red responses, and feel free to write responses to any of the yellow ones that don't yet have responses. (I think most of those were previously assigned to Stef.)

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780

cell (202) 380-7229  - 2010-12-27 RD Mitigation Responses for Greg.docx

ATTACHMENT REDACTED - DELIBERATIVE

**Stefania
Shamet/R3/USEPA/US**

12/27/2010 05:51 PM

To Gregory Peck, Matthew Klasen, Kevin Minoli

cc

bcc

Subject Erin's responses to comments 80A, 94A, 95A, 96A, 105A,
107A, 108A, 109A & 110A

Per our discussion. Erin did some responses (identified by number above) re the "middle third" of HW RD comments. I did some editing. Ran out of gas at 110A.



ATTACHMENT REDACTED - DELIBERATIVE

Erin Spruce Comments 12.22.docx

Christopher
Hunter/DC/USEPA/US
12/28/2010 09:00 AM

To Marcel Tchaou
cc
bcc
Subject Fw: Revision to PD Response # 154 -- OOPS! meant to
attach the decision.

Another reference for you. Carrie Travers in the Region is compiling all the Regional references they are adding and will send them to you in a batch soon, but I'm trying to make sure you have everything that I get as well.

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/28/2010 08:59 AM -----

From: Stefania Shamet/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA
Cc: Stephen Field/R3/USEPA/US@EPA, Carrie Traver/R3/USEPA/US@EPA
Date: 12/28/2010 07:16 AM
Subject: Revision to PD Response # 154 -- OOPS! meant to attach the decision.

(b) (5)

[REDACTED]

[REDACTED]



07-10-eqb and 07-12-eqb.pdf

WEST VIRGINIA ENVIRONMENTAL QUALITY BOARD

**WEST VIRGINIA HIGHLANDS CONSERVANCY,
OHIO VALLEY ENVIRONMENTAL COALITION,
and COAL RIVER MOUNTAIN WATCH,**

Appellants,

v.

**Appeal Nos. 07-10-EQB
07-12-EQB**

**LISA A. McCLUNG, DIRECTOR,
DIVISION OF WATER AND WASTE MANAGEMENT,
WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION,**

Appellee,

and

**ALEX ENERGY, INC., APOGEE COAL COMPANY, ATLANTIC LEASECO, LLC,
CATENARY COAL COMPANY, COAL-MAC, INC., CONSOLIDATION COAL
COMPANY, EAGLEHAWK CARBON, INC., ELK RUN COAL COMPANY, LLC,
GREYEAGLE COAL COMPANY, HAWTHORNE COAL COMPANY, ICG EASTERN,
LLC, INDEPENDENCE COAL COMPANY, JACKS BRANCH COAL COMPANY,
JUPITER HOLDINGS, LLC, LITWAR PROCESSING COMPANY, LLC, MAPLE
COAL COMPANY, MARFORK COAL COMPANY, INC., MINGO LOGAN COAL
COMPANY, OMAR MINING COMPANY, PAYNTER BRANCH MINING, INC.,
PERFORMANCE COAL COMPANY, RIVERSIDE ENERGY COMPANY, LLC,
SOUTHERN WEST VIRGINIA RESOURCES, LLC, UPSHUR PROPERTY, INC.,
VINDEK ENERGY CORPORATION, WOLF RUN MINING COMPANY,**

INTERVENORS.

FINAL ORDER

On November 15, 16, 19, and 20, 2007, a quorum of members of the West Virginia Environmental Quality Board ("Board") convened in Charleston, West Virginia and held an

evidentiary hearing in the above referenced appeals. At this hearing, the parties appeared by counsel. At the conclusion of the hearing, the Board announced it would establish a schedule for the parties' submission of proposed findings of fact and conclusions of law. On January 4, 2008, the Board provided the parties with the briefing schedule. The Board considered the proposed findings of fact submitted by the parties. Upon the testimony heard, evidence adduced, the submissions of the parties, the certified record, and the hearing transcript, the Board hereby in unanimity **REMANDS** the permit and **ORDERS** the WVDEP to modify the permit consistent with the findings, conclusions, and directions of this final order.

I. PROCEDURAL BACKGROUND

On May 4, 2007, the West Virginia Highlands Conservancy, the Ohio Valley Environmental Coalition, and Coal River Mountain Watch ("Appellants") appealed seventy-eight (78) compliance orders issued by the West Virginia Department of Environmental Protection ("DEP"), Appeal No. 07-10-EQB. Two (2) compliance orders that were not included in Appeal No. 07-10-EQB were challenged in a second appeal filed on May 8, 2007, Appeal No. 07-12-EQB. By the Board's order of September 5, 2007, the two appeals were consolidated and nine of the eighty challenged orders were dismissed on the voluntary request of Appellants. (Bd.'s Order of 9/6/07.)

By the Board's order of September 28, 2007, a four-day evidentiary hearing was set in the appeals for November 15, 16, 19, and 20, 2007. (Bd.'s Order of 9/28/07.) Prior to that hearing, two orders were dismissed as moot and the Board dismissed an additional 44 orders from the appeals without prejudice, on the joint motion of the Appellants and Intervenor. (Bd's Orders of 11/14/07.) Finally, during the hearing, the Board dismissed one further order from the appeals as moot, on the motion of the Appellants. (Tr. vol. 2, 5, November 16, 2007.)

Through the attrition described above, these appeals have been pared down to a challenge of the 24 compliance orders issued by DEP on April 5, 2007, associated with the following permits: (1) Apogee Coal Company, LLC's WV/NPDES Permit Number WV0099520; (2) Appalachian Fuels, LLC's WV/NPDES Permit Number WV0097144; (3) Black Wolf Mining Company's WV/NPDES Permit Number WV1006029; (4) Black Wolf Mining Company's WV/NPDES Permit Number WV1006118; (5) Catenary Coal Company's WV/NPDES Permit Number WV0096962; (6) Catenary Coal Company's WV/NPDES Permit Number WV1014684; (7) Coal-Mac, Inc.'s WV/NPDES Permit Number WV0068764; (8) Consolidation Coal Company's WV/NPDES Permit Number WV0040711; (9) Eastern Associated Coal Corp.'s WV/NPDES Permit Number WV0099015; (10) Elk Run Coal Company, Inc.'s WV/NPDES Permit Number WV1015848; (11) Hawthorne Coal Company, Inc.'s WV/NPDES Permit Number WV0039471; (12) ICG Eastern's WV/NPDES Permit Number WV0094889; (13) Independence Coal Company, Inc.'s WV/NPDES Permit Number WV1003887; (14) Independence Coal Company, Inc.'s WV/NPDES Permit Number WV1004140; (15) Independence Coal Company, Inc.'s WV/NPDES Permit Number WV1016024; (16) Independence Coal Company, Inc.'s WV/NPDES Permit Number WV1016890; (17) Jacks Branch Coal Company's WV/NPDES Permit Number WV0093912; (18) Maple Coal Company's WV/NPDES Permit Number WV1009311; (19) Marfork Coal Company's WV/NPDES Permit Number WV1014781; (20) Mingo Logan Coal Company's WV/NPDES Permit Number WV0065889; (21) Mingo Logan Coal Company's WV/NPDES Permit Number WV1011120; (22) Mingo Logan Coal Company's WV/NPDES Permit Number WV1004956; (23) Paynter Branch Mining, Inc.'s WV/NPDES Permit Number WV1016440; and (24) Riverside Energy Company's WV/NPDES Permit Number WV1018776. All but two of the

recipients of those 24 orders intervened in this matter: Appalachian Fuels, LLC, and Black Wolf Mining Company.

An evidentiary hearing before a quorum of the members of the Board was held on November 15, 16, 19, 20, 2007. The Board was comprised of Dr. Edward Snyder, Chairperson; Dr. D. Scott Simonton; Edward C. Armbrecht, Jr.; William H. Gillespie; and Dr. James Van Gundy. Appellants were represented by Derek Teaney, Esquire and Joseph M. Lovett, Esquire with the Appalachian Center for the Economy and the Environment. Appellee was represented by Heather Connolly, Esquire and Christopher Howard, Esquire of the Department of Environmental Protection's Office of Legal Services. Intervenor Consolidation Coal Company, Maple Coal Company and Paynter Branch Mining were represented by Christopher B. Power, Esquire and Robert B. Stonestreet, Esquire with Dinsmore & Shohl. Intervenor Hawthorne Coal Company, ICG Eastern, LLC and Riverside Energy were represented by Allyn G. Turner, Esquire and Andrew B. McCallister, Esquire with Spilman Thomas & Battle. Intervenor Eastern Associated Coal Company; Catenary Coal Company, LLC; Mingo Logan Coal Company; Independence Coal Company; Jacks Branch Coal Company; Marfork Coal Company, Inc.; Elk Run Coal Company, Inc.; Coal-Mac, Inc. dba Phoenix Coal-Mac Mining, Inc.; and Apogee Coal Company, LLC were represented by Robert McLusky, Esquire and Blair Gardner, Esquire with Jackson Kelly, PLLC.

At the hearing, Appellants' Exhibits 1 through 6, 7A through 7X, and 8 through 13 were admitted into evidence. Appellee's Exhibits 1 through 5 were admitted into evidence. Exhibits presented by Intervenor Consolidation Coal Company, Maple Coal Company and Paynter Branch Mining were admitted into evidence and designated as "Dinsmore 1" through "Dinsmore 7." Exhibit 1 presented by Intervenor Hawthorne Coal Company, ICG Eastern, LLC and

Riverside Energy was admitted into evidence and designated as "Spilman 1." Exhibits presented by Intervenor Eastern Associated Coal Company; Catenary Coal Company, LLC; Mingo Logan Coal Company; Independence Coal Company; Jacks Branch Coal Company; Marfork Coal Company, Inc.; Elk Run Coal Company, Inc.; Coal-Mac, Inc. dba Phoenix Coal-Mac Mining, Inc.; and Apogee Coal Company, LLC were admitted into evidence and designated as "Jackson Kelly 1" through "Jackson Kelly 5."

During the scheduled briefing phase of the appeal, Appellants' requested the Board take judicial notice of the official records of the WV Secretary of State's Office listing Pauline Canterbury as an officer of the non-profit organization Coal River Mountain Watch. Intervenor Elk Run Mining Company, Inc. filed a response in opposition to the Appellants' Motion. Elk Run argued the Appellants inappropriately seek the Board to take judicial notice of a key disputed matter in this case – the standing of Coal River Mountain Watch.

The *Procedural Rules Governing Appeals Before the Environmental Quality Board* state the following:

The rules of evidence as applied in civil cases in the circuit courts of West Virginia will govern evidentiary hearings before the board in accordance with section two, article five, chapter 29A of the Code of West Virginia.

46 CSR 4-§ 6.12. (2007).

The State Administrative Procedures Act allows the Board to take notice of judicially cognizable facts provided the parties are afforded an opportunity to contest the facts so noticed. *W.Va. Code* § 29A-5-2(d) (2007). Rule 201 of the *West Virginia Rules of Evidence* discusses judicial notice and in pertinent states a judicially noticed fact must be one not subject to reasonable dispute in that it is “. . . capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned.” *W. Va. R. Evid.* 201(a)(2).

Ms. Canterbury was a witness at the hearing. Both the Appellants' counsel and members of the Board failed to ask Ms. Canterbury if she was a member of Coal River Mountain Watch. Appellants seek the Board to review the documents filed with the Secretary of State's office to determine that Pauline Canterbury is a member of Coal River Mountain Watch.

Although the Appellants Motion was made after the close of the evidentiary hearing, Rule 201(f) of the *West Virginia Rules of Evidence* provides that judicial notice may be taken at any stage of the proceeding. The State Administrative Procedures Act provides that, "All parties shall be notified either before or during hearing, or by reference in preliminary reports or otherwise, of the materials so noticed, and they shall be afforded an opportunity to contest the facts so noticed." W. Va. Code § 29A-5-2(d).

Rule 201(e) of the *West Virginia Rules of Evidence* also provides for an opportunity for a party to be heard as to the propriety of taking judicial notice. Here, Elk Run Mining Company filed an objection or response on the basis that this notice would affect "standing" in this proceeding, the timeliness of the Appellants' Motion, and an objection to an infringement on its due process right to challenge the accuracy of the source of the requested notice. The Board disagrees. The Board has not been asked to judicially recognize Coal River Mountain Watch as having standing in this matter. The Board has been asked to take Judicial Notice of an official record contained in the Secretary of State's Office and published to the public via searchable format on the official website of the Secretary of State.

The statute and rules governing judicial notice and its application do not specify when a request for judicial notice must be made, nor have West Virginia decisions concerned themselves with when a party must make the request for judicial notice. The Intervenor filed a four-page, well-researched brief on this question. The Board finds that all parties had a right and

opportunity to contest the source and the facts requested to be noticed. The Appellants Motion is Granted and Judicial Notice is taken of the *West Virginia Secretary of State Business Organization Information System On-Line Reference* page indicating that Pauline Canterberry is an officer of Coal River Mountain Watch.

The Appellants filed a Motion for Recusal of Board Member William Gillespie based on comments written by Mr. Gillespie about this appeal in a letter to Governor Joe Manchin on August 17, 2007. Mr. Gillespie reviewed the Motion and denies the Motion for Recusal and states that he believes he is able, and did, consider the arguments of the parties without prejudice.

II. STANDARD OF REVIEW

The Board hears appeals of orders issued by Appellee de novo and in accordance with W. Va. Code § 22B-1-7. The Board does not afford deference to the Director's decision. *W. Va. Division of Env'tl. Protection v. Kingwood Coal Co.*, 200 W. Va. 734, 745, 490 S.E.2d 823, 834 (1997). Under W. Va. Code § 22B-1-7(g), the Board "shall make and enter a written order affirming, modifying or vacating the order, permit or official action of the chief or secretary, or shall make and enter such order as the chief or secretary should have entered."

To prevail in the appeal, the Appellants must raise an issue with sufficient evidence to support a finding that the Appellee's decision was incorrect. If sufficient evidence supported such a finding, then the Appellee would have to produce the evidence demonstrating why its decision was sound, regardless of the Appellants' evidence. The Appellants have an opportunity to show that the evidence produced by the Appellee is pre-textual or otherwise deficient. This shifting burden of proof standard was set out in a case before the Circuit Court of Kanawha County, *Wetzel County Solid Waste Authority v. Chief, Office of Waste Management, Division of Environmental Protection*, Civil Action Number: 95-AA-3 (Circuit Court of Kanawha County,

1999). The Kanawha County Circuit once again approved the use of the *Wetzel County* burden-shifting rule in environmental appeals in *Sierra Club v. Benedict*, Civ. Action No. 07-AA-42, Slip Op. at 6 (Kanawha County Circuit Ct. June 29, 2007). While *Wetzel County* is merely persuasive authority, the Board agrees with the analysis and has used that test here.

III. STATEMENT OF ISSUES

Intervenors in this case argue that the parties do not have standing to bring the appeal and therefore the question for the board should be resolved quickly, and simply, on a jurisdictional basis. Intervenor seek the Board's dismissal of the appeal for lack of jurisdiction because the Appellants do not have standing to bring the present action.

Appellants argued that the challenged orders are deficient on multiple levels. Appellants argue there is a dichotomy between two uses of compliance schedules: (1) as a permit condition or (2) as part of a compliance or enforcement order. Whereas a permitting authority has broad discretion in its use of a compliance schedule as an enforcement tool in a compliance or enforcement order, there are strict regulations on a permitting authority's incorporation of a compliance schedule into the terms of an NPDES permit.

Appellants argued that DEP's attempt to modify the terms of the underlying WV/NPDES permits through the challenged compliance orders fell well short of the legal requirements for such a modification. Consequently, if DEP wanted to use the compliance schedules as an enforcement tool, it should not have purported to modify the permits.

Appellants argued there are seven flaws in the challenged orders, each of which constitutes an independent ground on which the Board could void the challenged orders.

Four of the seven flaws relate to the permit modification. First, Appellants argued that West Virginia law prohibits the incorporation of compliance schedules for post-1977 water

quality standards into WV/NPDES permits issued to coal mining facilities. Second, they argued that the purported modifications are substantively defective because they violate the anti-backsliding provisions of the CWA (and a subset of seven orders also violate the prohibition on the revision of Total Maximum Daily Load (“TMDL”)-based effluent limitations). Third, because there were no lawful grounds for a major permit modification, the underlying terms of the permits remain unchanged. Fourth, because DEP failed to comply with the procedural requirements for a major permit modification, under well-settled law the challenged orders can have no effect on the underlying permits.

Three of the flaws relate to the compliance schedules. The applicable federal and state regulations require three findings prior to the issuance of a compliance schedule. Appellants argued that the record in these appeals is inadequate to support any of the three findings. First, the record is inadequate to support a finding that the compliance schedule will lead to compliance with the selenium WQBELs by the final compliance date. Second, the record is inadequate to support a finding that the compliance schedules are appropriate. Third, the record is inadequate to support a finding that the compliance schedules require compliance as soon as possible.

The Appellants argued that the Board should vacate the challenged orders. Alternatively, even if the Board does not vacate the compliance orders, the Board should modify the challenged orders by deleting language purporting to modify the underlying permits, leaving in place the enforcement agreement between DEP and the permittees.

The Appellee and Intervenor argued that the statute confers the authority of the WVDEP to modify the permit with a compliance schedule, and that the statute trumps the coal NPDES regulations and allows the use of a compliance schedule, and that if any procedural violation

occurred in the notice and comment portion of the modification said violation was cured by later action of the WVDEP.

IV. FINDINGS OF FACT

After due consideration of the testimony heard, evidence adduced, the submissions of the parties, the certified record, and the hearing transcript, and each and every finding proposed, the Board hereby rejects, accepts, incorporates, or modifies each such proposed finding by adoption of the Board's own Findings of Fact as set forth below:

General Findings

1. In April 2007, the West Virginia Department of Environmental Protection ("WVDEP") issued 78 Compliance Orders to existing West Virginia National Pollutant Discharge Elimination System permits ("WVNPDES") which are the subject of these appeals. (Certified Record ("CR") 202 through 999.) The original orders were issued in 2004.

2. On May 4, 2007, the West Virginia Highlands Conservancy, the Ohio Valley Environmental Coalition, and Coal River Mountain Watch ("Appellants") appealed seventy-eight (78) compliance orders issued by WVDEP, Appeal No. 07-10-EQB. Two (2) compliance orders that were not included in Appeal No. 07-10-EQB were challenged in a second appeal filed on May 8, 2007, Appeal No. 07-12-EQB. (Appellants' Notices of Appeal 07-10-EQB and 07-12-EQB.)

3. The Appellants were aggrieved by the Compliance Orders that extended the schedules of compliance for the WVNPDES permits, and extended the deadline for the final selenium effluent limitations for three (3) years from the effective date of the Orders. (Appellants' Appeal p..6.)

4. By the Board's order of September 5, 2007, the two appeals were consolidated and nine of the eighty challenged orders were dismissed. (Bd.'s Order of 9/6/07.)

5. Selenium is a naturally occurring non-metal element. Low levels of selenium are beneficial, if not necessary, to the health of plants and animals. However, ingestion of high levels of selenium can cause adverse health conditions. (Appellants' Exhibit 10).

6. In 1992, this Board¹ adopted the current water quality standards for total selenium of 5 parts-per-billion ("ppb") on a chronic basis and 20 ppb on an acute basis as recommended by the United States Environmental Protection Agency. W.Va. C.S.R. § 47-2, App. E, Table 1.

7. The presence of selenium in mining-related discharges was first discovered in the early 2000's when the initial results of the studies undertaken as part of the Draft Programmatic Environmental Impact Statement on Mountaintop Mining-Valley Fills ("Draft EIS") were published. The findings of those studies indicated that selenium was present in streams where mining operations had taken place or were ongoing. At the time, DEP had not ascertained whether the selenium discharges were confined to certain watersheds, certain geologic strata, or were connected to mining at all. The analysis for selenium is not trivial, requiring a lot of expertise, specialized equipment and exceedingly careful pre-treatment of the sample before analysis. (Tr. Vol. I, 7, November 15, 2007).

8. Selenium is found mostly in certain southern West Virginia coal seams and shale strata associated with these seams. When these strata are excavated and exposed to water, selenium can be released in a dissolved form in water. Once dissolved, selenium is most commonly found in two anionic forms – selenite and selenate. Selenite is the more toxic of the two common forms of selenium, but is easier to remove from water. Selenate is less toxic than

¹ In 2005 the West Virginia Legislature transferred all water quality standards rule-making authority from this Board to the WV Department of Environmental Protection.

selenite, but much more difficult to remove from water. The selenium present in mining-related discharges is predominantly in the selenate form. Selenium is predominantly present in mine-water discharges in southern West Virginia particularly associated with Upper Kanawha-Lower Allegheny coal beds. Discharges from mines in northern West Virginia do not typically contain selenium at measurable levels. (Tr. Vol. III, 12-14, November 19, 2007).

9. The discharges from these mined areas are almost uniformly gravity or precipitation-induced. Most are discharges from in-stream sediment ponds below the toe of a valley fill. (Id., 22-24).

10. Based on the research that identified the potential selenium-bearing strata, DEP imposed a requirement of “material handling plans” for active and new operations to ensure that the selenium-bearing strata is separated and isolated in water resistant cells during the mining sequence to prevent selenium from dissolving and being released. (Tr. Vol. II, 105-106, November 16, 2007).

11. Since discovery of the selenium issue, any permits for new operations in areas with streams shown to contain high selenium concentrations had selenium effluent limits that became effective at the commencement of the operation. No compliance schedules have been issued for new operations. (Id. 103-104).

12. DEP placed streams with excess selenium concentrations on the “303(d)” list as “impaired” pending development of a “total maximum daily load” (“TMDL”) for selenium in the stream. As the waste load allocations for the TMDLs were calculated, much more stringent selenium effluent limits were included in relevant NPDES permits. (Id.).

13. The West Virginia Department of Environmental Protection’s Watershed Assessment Branch is conducting a study to determine the bioaccumulation rates of selenium

among the fishes of West Virginia's streams and lakes in areas affected by coal mining and identify toxic effects among other forms of potentially exposed wildlife. (Appellants' Exhibit 4, ¶ 5).

14. Starting in 2004, DEP began imposing selenium monitoring requirements upon renewal of WV/NPDES permits that governed mining-related discharges from existing facilities into streams shown to have high selenium concentrations emanating from past or current mining operations. DEP also imposed three-year compliance schedules for these permittees to meet the final selenium effluent limits. Depending on when a particular compliance schedule was issued, they were set to expire sometime between 2007 and 2009. (Tr. Vol. II, 102-105, November 16, 2007).

15. DEP did not determine that every operation that received a compliance schedule demonstrated a statistical "reasonable potential" to discharge selenium in amounts that would violate water quality standards. A permittee could have received a selenium compliance schedule or order for several reasons. One group of permits were issued compliance orders simply because water sample results for selenium were reported using the wrong order of magnitude-milligrams-per-liter instead of micrograms-per-liter (parts per billion or "ppb"). A second group received compliance orders because the laboratory analyzing the samples for selenium did not use an analytical method with a minimum detection level below 5 ppb. A third group received compliance orders because the receiving stream for the discharge was on the "303(d) list" as impaired for selenium. A fourth group received compliance orders because DEP designated the coal seams being mined as a potential source of selenium. (Id.).

16. A fifth group received selenium compliance orders because the "discharge monitoring report" ("DMR") data showed that there was a statistical "reasonable potential" that

selenium concentrations in the discharge could be above what would be the water quality based effluent limits. (Id.).

17. The WVDEP did not do an evaluation of each permittee to determine the “reasonable potential” to discharge selenium concentrations above the water quality based effluent limits. (Id. 86-88).

18. The WVDEP did not make a reasoned decision about each permittee and instead issued the same compliance schedule for each operation regardless of the conditions on the ground, in the laboratory, or in the water. (Tr. Vol. I, 307, November 15, 2007).

19. Since 2001, environmental consultants have conducted field studies in West Virginia streams that contain selenium concentrations well above the 5 ppb water quality standard to evaluate whether the selenium concentrations are having an adverse impact on aquatic life. The data submitted to the Board and the testimony from the Intervenor’s expert witness, Dr. Mindy Armstead, indicated that streams with selenium concentrations well above the 5 ppb standard do not show signs of environmental harm like those associated with the Belews Lake study. (Tr. Vol. III, 202-204, November 19, 2007).

20. WVDEP underwent various efforts to research the issue of selenium. a.) No compliance schedule was issued for new operations. (Tr. Vol. II, 103-104, November 16, 2007). b.) Streams with high selenium concentrations are considered “impaired” and placed on a “303(d)” list for selenium pending development of a “total maximum daily load” (“TMDL”) of selenium for the stream. (ID. at 103- 105). c.) Stringent selenium effluent limits were added to NPDES permits as the waste load allocations for the TMDL’s were calculated. (Id.) d.) WVDEP worked with the West Virginia Geological Survey and United States Geological Survey to identify coal seams and geologic strata that have potential to discharge selenium above 5 ppb

if disturbed. (Id. at 104). e.) WVDEP developed plans for active and new operations to ensure the selenium bearing strata is separated and isolated to prevent selenium from leaching out. (Id. at 105). f.) Conducted research on the availability of water treatment technology to reduce selenium concentrations below the 5 ppb water quality standard. (Id. at 107-108). and g.) Commenced studies on the selenium bioaccumulation rate for wildlife in West Virginia and evaluated the extent of any environmental harm. (Id. at 266).

21. Despite this effort, Mr. Politan testified his research did not include: scientific journals, paid internet research, scientific trade publications, or any independent inquiry beyond the first level of information. Consequently, DEP's research did not identify any readily available selenium treatment technology that would be feasible to employ in mining settings in West Virginia that can consistently reduce total selenium concentrations in mining-related effluent to below the existing 5 ppb water quality standard. (Id. at 55, 56, 108, 109, 111, 112, 147, 148, 166, 167, 207-212).

22. If a permittee could not achieve compliance with the final selenium effluent limit before expiration of a compliance schedule, and non-compliance continued into the future, the permit may be revoked and the associated bond forfeited. In the event of a bond forfeiture, the DEP becomes responsible for treating the water at the formerly permitted facility. As of the date of the evidentiary hearing in this matter, DEP had not identified any feasible selenium treatment technology that it could employ at formerly permitted sites in the event of bond forfeiture. (Id. at 271).

23. To allow permittees additional time to identify whether they actually had a reasonable potential to violate selenium water quality standards, and if so, develop appropriate

selenium treatment technology, DEP decided to extend the original compliance schedules for an additional three years. (Id. at 109).

24. In early 2007, DEP published public notices of its intent to modify the WV/NPDES permits for the Intervenor and other permittees by extending the compliance schedule for the permittees to achieve the final effluent limits for selenium. (Id. at 133, 142).

25. The notice for each permit was published in a Class I legal advertisement in newspapers of general circulation in the areas where the operations governed by the affected WV/NPDES permits are located and sent via electronic mail to persons who have registered to receive such notices from DEP. (Id.).

26. Specific notice of compliance orders was sent to the following government agencies on November 14, 2007: United States Fish & Wildlife Service field office in Elkins, West Virginia; United States Army Corps of Engineers, Huntington District; West Virginia Office of Air Quality; and West Virginia Department of Natural Resources. These agencies were provided 30 days to submit comments on the compliance orders. (Id. at 127, 128, 141).

27. The specific notice provided to the governmental agencies was filed on the first day of the evidentiary hearing in this matter and nearly eight months after the WVDEP's decision to modify the permit and grant the compliance schedule. (Id. at 141).

28. On April 5, 2007, DEP modified the Intervenor's WV/NPDES permits by issuing the compliance orders that are the subject of the present appeal. (Id. at 112).

29. The terms and conditions of all such compliance orders are identical except for permit number, the permittee's name, and the attached DMR forms. (Tr. Vol. I, p. 328, November 15, 2007).

30. The effect of the compliance orders is to modify the underlying permit to extend the deadline for the permittees to achieve compliance with the final water quality-based effluent limits for selenium until April 5, 2010. The compliance orders also establish the following interim requirements and dates for their achievement: (1) submission of status reports to DEP every six months; (2) submission of a treatment plan by April 5, 2008; and (3) installation of a treatment facility by April 5, 2010. Each of the permittees that received a compliance order was presently operating under either a previous compliance order or a compliance schedule set forth in its WV/NPDES permit that was due to expire before April 5, 2010. (CR at

31. As of April 5, 2007, the original compliance schedule for all the permits that received compliance orders had not yet expired. In other words, none of the permittees who received the compliance orders had final selenium effluent limits in effect as of April 5, 2007. (Id.).

32. DEP does not contemplate any additional extensions of the final compliance date for the selenium effluent limits. (Tr. Vol. II, p. 286, November 16, 2007).

33. The Board received testimony about a number of experimental treatment technologies under development: catalyzed cementation, biological reduction, and reduction with “zero valent iron.” (Tr. Vol. III, p. 21, 29, 30, 40, 59, 133, 135, 279, November 19, 2007) (Tr. Vol. IV, p. 52, 53, 105, 114, November 20, 2007).

34. The Board heard testimony about two proven treatment technologies to reduce selenium concentrations below 5 ppb – iron hydroxide and reverse osmosis (“RO”). However, at this time it is unknown whether or not these technologies are feasible for coal-mine settings. (Tr. Vol. III, p. 24, 29, 55, 57, 59, 63, 116-127, 129-131, 136, 169, 184, 189, 191, 192, November 19, 2007).

35. The Board heard extensive testimony from the Intervenors' witnesses regarding the infeasibility of RO to treat mining-related discharges. First, the disposal of brine is a substantial problem. Second, the necessity of electricity would make the RO treatment difficult. Third, a RO system would require substantial capital cost of constructing a treatment system and high operating cost. Fourth, a RO system would require substantial space to construct a treatment facility. (Tr. Vol. III, p. 24, 55, 57, 63, 116-119, 121-127, 129-131, 136, 169, 184, 189, 191, 192, November 19, 2007).

36. The West Virginia Water Research Institute, through Dr. Ziemkiewicz and Dr. Raymond Lovett are presently investigating a selenium treatment technology that uses "zero valent iron" to remove selenium from water. This treatment involves passing water through a steel wool-like medium that causes selenium (both selenite and selenate) to adhere to the medium and thereby reduce the selenium concentration in the water. This technology is passive – it does not require electricity to operate. The anticipated space required to install a treatment system is relatively small. The installation costs are anticipated to be between \$100,000 and \$150,000 for a 200 gallon per minute treatment system. Operating costs are expected to be relatively low. Although the technology is still in the experimental stage, the initial test results demonstrate an ability to reduce selenium concentrations to below 5 ppb. (Tr. Vol. III, p. 29, 59, 148-149, November 19, 2007).

37. The Board finds that the WVDEP and the Intervenors have neglected the problem and not acted with an appropriate sense of urgency to discover a treatment solution to the problem of selenium in the state's waters.

38. Due to this neglect, the Board finds that the evidentiary record contains no evidence of a feasible and readily available treatment technology suitable for removing very low levels of selenium from water in the coal mining setting.

Intervenor-Specific Findings of Fact

39. Intervenor Consolidation Coal Company (“CCC”) holds WV/NPDES Permit No. WV0040711, which authorizes discharges from, among other outlets, an acid mine drainage treatment plant, referred to as the “St. Leo” plant, through Outlet 16, discharging into an unnamed tributary of Dunkard Creek in Marion County, West Virginia. Outlet 16 is the only outlet with a selenium monitoring requirement and compliance schedule. CCC first received monitoring requirements and a compliance schedule for selenium from Outlet 16 by Order dated May 16, 2005. Under the May 16, 2005 Order, CCC was required to achieve final selenium effluent limits at that outlet by May 16, 2008. By Order dated April 5, 2007, DEP extended CCC’s deadline for achieving compliance with the final selenium effluent limits until April 5, 2010.

40. CCC has initiated a number of efforts to address the levels at which its operations actually discharge selenium, and to ensure the selenium concentration will comply with the final effluent limits in its permit that become effective in April of 2010. Based on a review of past analytical data, CCC has found that there were problems with the accuracy of the laboratory analyses conducted on water samples. The sample results show erratic and unusually high selenium concentrations, particularly for a facility located in northern West Virginia - an area that typically does not exhibit selenium in mining-related discharges. CCC is undertaking an effort to address the accuracy of the past data and ensure that the results of future sample analyses are accurate. (CR, 242-248) (Tr. Vol. IV, p. 15-29, November 20, 2007).

41. In terms of evaluating potential treatment options, CCC employees have researched the existing and experimental selenium treatment technologies and evaluated their feasibility to treat water at its operations. CCC employees have attended conferences, talked with experts, and otherwise kept abreast of developing selenium treatment technologies. CCC has even developed pilot scale selenium treatment experiment. (Tr. Vol. IV, Id).

42. According to testimony in the record it is unlikely CCC could achieve compliance with the final selenium effluent limits if they became effective on May 16, 2008. (Id. at 28).

43. Intervenor Maple Coal Company ("Maple") holds WV/NPDES Permit No. WV1009311, which authorizes discharges from active surface mines and one partially reclaimed mine into Armstrong Creek and Lower Paint Creek. The operations are located in Kanawha County and Fayette County, West Virginia. Maple first received monitoring requirements and a compliance schedule for selenium by DEP Order dated May 16, 2005. Under the May 16, 2005 Order, Maple was required to achieve final selenium effluent limits by May 16, 2008. By Order dated April 5, 2007, DEP extended Maple's deadline for achieving compliance with the final selenium effluent limits until April 5, 2010. (Tr. Vol. IV, p. 226-264, November 20, 2007).

44. Maple received a transfer of this permit in November of 2005 from Lexington Coal Company, which was an entity created to administer coal assets held by the bankruptcy estate of the now-defunct Horizon Natural Resources. Maple has not conducted any surface mining on the property governed by the permit since it received transfer of the permit. Since acquiring the permit, Maple has undertaken a number of efforts to address existing selenium discharges. Maple has sampled and analyzed overburden from previously mined areas and conducted water sampling in surrounding streams in an effort to identify the source of selenium discharges. Maple has evaluated future mining plans that could help reduce or eliminate existing

discharges. Maple has evaluated potential selenium treatment technology and is staying abreast of developments. (Id).

45. According to testimony it is unlikely Maple could achieve compliance with the final selenium effluent limits if the became effective on May 16, 2008. (Id).

46. Intervenor Paynter Branch Mining, Inc. ("Paynter Branch") holds WV/NPDES Permit No. WV1016440, which authorizes discharges from a surface mine and associated haulroad into Cub Trace of Paynter Branch; an unnamed tributary of Paynter Branch; and Paynter Branch itself. Paynter Branch first received monitoring requirements and a compliance schedule for selenium when its permit was reissued on January 31, 2006. Under the reissued permit, Paynter Branch was required to achieve final selenium effluent limits by either January 31, 2009 or February 1, 2009 depending on the outlet. By Order dated April 5, 2007, DEP extended Paynter Branch's deadline for achieving compliance with the final selenium effluent limits until April 5, 2010.

47. DMR data for Paynter Branch's operations show a consistent pattern of selenium concentrations well below what would be the final selenium effluent limits. It would appear that the Paynter Branch compliance order falls within the category of compliance orders that allow time for the permittee to submit a petition to DEP, demonstrating that there is no "reasonable potential" for causing a violation of the selenium water quality standards.

48. Riverside Energy Company is the holder of WV/NPDES permit number WV1018876, issued by the DEP on February 28, 2006. This permit allows Riverside to discharge wastewater associated with its Cherokee Mine in McDowell County, West Virginia, into the Left Fork of Sandlick Creek and unnamed tributaries of the Left Fork of Sandlick Creek.

49. Riverside's Permit number WV1018876, contained both final and interim limits for selenium. The interim limits were set to expire on February 28, 2009. The permit also included a compliance schedule that directed Riverside to comply with certain benchmarks. Prior to February 28, 2006, Riverside had never had a limit for selenium in this permit.

50. ICG Eastern, LLC ("ICG Eastern") is the holder of WV/NPDES permit number WV0094889, issued by the DEP on July 6, 2004. This permit allows ICG Eastern to discharge wastewater associated with its Knight Ink Mine in Webster County, West Virginia, into two tributaries of Big Beaver Creek. These two streams are headwater streams for Big Beaver Creek.

51. ICG Eastern conducted over two years of sampling before a sample revealed a level of selenium greater than what would be the final effective limits for selenium in its permit. Prior to this occurrence in February 2007, ICG Eastern had no reason to suspect that it would need to institute any treatment methodology to reduce selenium concentrations in its effluent below the final limits in its permit. (Tr., Vol. IV, p. 168 to 169, 11/20/2007).

52. Hawthorne is the holder of WV/NPDES permit number WV0039471, issued by the DEP on July 6, 2004. This permit allows Hawthorne to discharge wastewater associated with its preparation plant in Upshur County, West Virginia, into Sawmill Run.

53. Hawthorne's Permit number WV0039471, contained both final and interim limits for selenium. The interim limits were set to expire on July 6, 2007. The permit also included a compliance schedule that directed Hawthorne to comply with certain benchmarks. Prior to July 6, 2004, Hawthorne had never had a limit for selenium in this permit.

Anti-backsliding

54. The original WV/NPDES permits issued to the Intervenor did not include any limit on selenium because the WVDEP was unaware that it could be or was present in the

discharges at levels that could exceed the water quality standard of 5 ppb. (Tr. Vol. II, p. 220, November 16, 2007).

55. The WVDEP began including selenium limits in the WV/NPDES permits for coal mining operations soon after discovering that selenium discharges from mine sites could contribute to high levels of selenium in certain streams in West Virginia. The WVDEP included interim and final selenium limits in the permits for existing facilities. The interim limits were effective for three years from the date of permit issuance and imposed a “monitor only” requirement for that period. At the conclusion of the “monitor only” period, the final limits of 4.7 ppb for monthly average and 8.2 ppb for maximum daily were set to become effective.

56. The WVDEP issued the challenged compliance orders on April 6, 2007. No compliance order extending the length of the interim limits was issued to a permittee who held a permit with final effective limits for selenium. No final limit for selenium was replaced by an interim limit as a result of the WVDEP’s action. (Id. at 113).

Defacto Variance

57. A compliance schedule is defined in the Clean Water Act as “a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.” 33 U.S.C. §1362(17).

58. The compliance orders do not modify the final limits for selenium in any of the permits. The effective date of the final limits for selenium is now April 5, 2010. The compliance schedules include benchmarks that the permittee must meet, including the submission of a treatment plan within one year of the effective date of the order. (CR. at

59. The Board finds that the compliance schedules in this case do not constitute a defacto variance because the Intervenor and WVDEP have presented evidence of intent to comply with the final permit limits. (Tr, Vol. II, p. 9-12, November 16, 2007).

Standing

60. All of the witnesses that Appellants presented to establish their standing to bring this appeal are members of one or more of the Appellant organizations.

61. All the witnesses the Appellants presented to establish standing satisfied the necessary legal requirements to have standing to pursue these appeals before the Board. (Tr, Vol. I, p. 38-55, 56-100, 101-108, 109-124, 125-138, 139-152, 153-186, 187-301, November 15, 2007) (Tr. Vol. II, p. 8-27, November 15, 2007).

Compliance Schedules In WV/NPDES Permits

62. West Virginia's selenium water quality standard was promulgated after July 1, 1977.

63. The numeric aquatic-life criterion for selenium of 5 µg/l does not include any language authorizing compliance schedules.

64. Contrary to the NPDES regulations for Non-Coal Facilities, the Coal NPDES regulations do not authorize the use of compliance schedules to achieve post-July 1, 1977 water quality standards.

65. WVDEP and this Board administer a federally-approved state program. West Virginia's State Water Pollution Control Act, *W.Va. Code* § 22-11-6, authorizes WVDEP to issue schedules of compliance for meeting water quality-based effluent limits.

66. A subset of the 24 compliance orders at issue in this appeal affect streams that are not in attainment with the selenium water quality standard.

67. Those seven compliance orders are associated with the following WV/NPDES Permits that have waste load allocations pursuant to the Coal River Total Maximum Daily Load (TMDL) for selenium: (1) Mingo Logan Coal Company's WV/NPDES Permit Number WV0065889; (2) Mingo Logan Coal Company's WV/NPDES Permit Number WV1011120; (3) Mingo Logan Coal Company's WV/NPDES Permit Number WV1004956; (4) Elk Run Coal Company's WV/NPDES Permit Number WV1015848; (5) Independence Coal Company's WV/NPDES Permit Number WV1016890; (6) Catenary Coal Company's WV/NPDES Permit Number WV0099692; and (7) Catenary Coal Company's WV/NPDES Permit Number WV1014684. (Appellants' Hearing Exhibit 3) (Tr. Vol. I, p. 341-344, November 15, 2007).

68. The selenium water quality standard is not being met in the streams into which those seven permits discharge, specifically Beech Fork, Left Fork of White Oak Creek, Seng Creek, Trace Branch, and James Creek. (Appellants' Exhibit 3) (Tr. Vol. I, p. 346).

69. During the term of the compliance orders at issue, the selenium water quality standard in the affected streams will not be attained. (Tr. Vol. II, p. 51, November 16, 2007).

70. Even full compliance by all the permittees that received compliance orders may or may not have an impact on attaining the selenium water quality standard. (Id at 178).

71. The selenium water quality standard is an aquatic life criterion.

72. The streams affected by the seven permits identified above have a designated use for the propagation of aquatic life.

73. That designated use has not been removed from the affected streams.

Grounds For Major Permit Modification

74. DEP treated the compliance orders as major modifications of the underlying WV/NPDES permits. Therefore, the rules governing major permit modifications apply. The

NPDES rule for coal operations states that permit modification is appropriate when DEP determines that good cause exists for modification of a compliance schedule. Examples of good cause include “an act of God, strike, flood, material shortages, or other events over which the permittee has little or no control and for which there is no reasonably available remedy.” *W. Va. C.S.R. & 30.8.2.c.2.D*. It is clear from this list that good cause can be found, at a minimum, because of natural disasters (e.g., flood), human induced causes (e.g., strike), or logistical problems (e.g., materials shortage). The rule’s reference to “strike” and “materials shortage” shows that good cause goes beyond the unexpected natural catastrophe and extends to other unforeseen or unavoidable problems. The link between these “causes” is that they are all beyond the permittee’s control and there is not a “reasonably available remedy” for the problem.

75. It is maintained that some “other event[] over which the permittee has little or no control and for which there is no reasonably available remedy” supplies the requisite good cause for permit modification. (Tr. Vol. II, p. 252, November 16, 2007). 47 C.S.R. § 30-8.2.c.2.D.

76. The Board finds good caused existed for issuance of the compliance orders because the limited research conducted by the WVDEP and the permittees did not discover a feasible treatment technology for selenium in coal mine settings. This failure couple with the inability to “turn off” the discharges from existing facilities constituted “events over which the permittee had little or no control and for which there is no reasonably available remedy.”

Procedural Errors In The Permit Modification

77. Although DEP published notice of its intent to issue the challenged orders in various newspapers and sent notice to its email distribution lists, that notice did not inform the public that the proposed action constituted a permit modification. (Appellee’s Hearing Exhibit 1).

78. The notice published by DEP did not include the term “draft permit.” *Id.*

79. Notice that a draft permit is available is vital information because without it, potentially interested members of the public were not put on notice that DEP intended to modify the terms of the WV/NPDES permits themselves.

80. DEP did not prepare draft permits in association with the issuance of the challenged orders. Rather, it prepared a document that it calls a “draft order” for each of the challenged orders. (Tr. Vol. I, p. 307, November 15, 2007).

81. The draft order did not include all applicable conditions under Section 5 and 6 of the legislative rule applicable to WV/NPDES Permits issued to coal-mining facilities, all of the monitoring requirements of the permit, or all of the effluent limitations, standards, prohibitions, and conditions and all variances under Section 14. (*Id.* at 316-18).

82. The draft permit prepared in association with another recent permit modification included much of the information that DEP asserted was not required in a draft permit. (Appellants’ Hearing Exhibit 5).

83. DEP did not provide notice of the proposal of the challenged orders to the affected federal agencies as require by law. (Tr. Vol. II, p. 16-27, November 16, 2007).

84. DEP attempted to cure this deficiency by sending the notices to the affected federal agencies or about the first day of the hearing in this matter (more than six months after the agency action was finalized). (*Id.* at 127).

85. The proposal of more than 80 identical compliance orders is an unprecedented action by DEP. (*Id.* at 193).

86. The United States Fish and Wildlife Service—which would have received a notice of the proposed compliance orders had DEP complied with the law—has demonstrated an

interest in selenium levels in West Virginia's waters. (Id. at 194-95).

87. It cannot be said with certainty that the federal agencies would have ignored notice of the proposed compliance orders in the way that they may ignore other notices that they receive.

V. DISCUSSION

Policymakers, regulators, coal operators, and environmentalists in West Virginia have been challenged to address the causes and effects of selenium pollution in the waters of the state. Four of the five members of the Environmental Quality Board are college professors or adjunct faculty at various colleges and universities in West Virginia. This unique background resulted in a common analogy being made during the decision-making discussions of the Board. The circumstances surrounding the selenium problem and subsequent action are analogous to a doctorate student beginning his or her research the night before defending his or her thesis. Too much time has been wasted and too little has been done to address problem. What is perhaps even more amazing is how little the WVDEP seems to expect from the coal industry. WVDEP and the coal industry are asking for more time and yet the lack of urgency continues.

Board member Armbrecht asked each representative from the Intervenors to calculate the amount of staff time being devoted to finding a solution to this problem. The answers were stunning. One representative said, 8% of one employee's time, another was 10%, and the highest percentage came from Consolidation Coal Company who said it was currently dedicating 25% of one employee's time to finding a solution to the selenium problem. Ken Politan, WVDEP's point person on the problem, testified that when he did his internet research if he ran into a site that asked him to pay for information or to review proprietary information, he ended his search. He testified that he did not contact the owner or researcher of the proprietary

information or the University that may have sponsored the research. This board does not place all of the blame on WVDEP. It is not the WVDEP's responsibility, nor is it the Appellants, to locate and distribute the technology to treat selenium in the mine waters of the state. However, if the WVDEP is going to give the industry more time to comply with the standard then it should have assessed each permit and site and made an individual determination of what would constitute reasonable milestones and compliance deadlines. Instead, in one swoop the WVDEP gave a blanket extension with meaningless milestones of action.

The WVDEP failed to construct a meaningful compliance schedule. The WVDEP took a massive problem and applied a one-size fits all solution to it. The solution falls short on specifics and milestones for success. A meaningful compliance schedule must be tailored to each individual permit and circumstances surrounding the property. During the course of the hearing it became apparent that the WVDEP was unaware of the site specific conditions of these permits, it didn't fully understand the discharge monitoring reports, and it was unable to tell the Board what facilities were meeting the selenium standard, and particularly the WVDEP was unable to say whether these facilities could and would meet the standard at the end of the compliance schedule. (While the WVDEP does not have a crystal ball to predict what will happen at each of these sites, it should have built stronger milestones into the compliance schedule so that it could predict that compliance would be achieved at the end of the schedule. A compliance schedule is not meant to be a "general" permit all containing the same parameters and milestones. The Board finds that WVDEP should have assessed each permit and mine operation and developed an individual compliance schedule for each permit and permittee.

The Appellants argued that it doesn't matter that there isn't a treatment solution immediately available on these mine sites and that the industry must immediately comply with

the selenium water quality standard. Intervenors argued that if forced to immediately comply with the selenium standard, many of the coal companies would likely go bankrupt, and the state of West Virginia would assume responsibility for paying to solve the water quality problem. The Board is sympathetic to the Appellants argument but agrees with the Intervenors that forcing immediate compliance would not result in an environmental victory for the waters of the state or the people of West Virginia.

For above reasons, the Board is remanding the permits back to WVDEP for changes consistent with this order. The WVDEP shall comply with the Board's order within thirty- days (30) of receipt of this order. Specifically the Board orders the WVDEP to review each of these permits, individually, and design a compliance schedule that is site and permit specific. The compliance schedule should include meaningful milestones and requirements to demonstrate what the permittee is doing to achieve compliance. The Board recommends two month time frames for reporting and the milestones should include but not be limited to: a review of the on the ground potential to release selenium; findings of fact specific to each site, literature review, bench scale studies and pilot studies, a list of contractors, number of employees and financial resources assigned to the task. The milestones contained in the permit and compliance schedule shall include a "certification" of conformity by WVDEP. Said certification shall be made by WVDEP within ten (10) business days after receipt. Certification, or failure to act on a certification, is considered an official agency action that can be appealed to this Board and the Board commits to schedule the appeal and hold the evidentiary hearing in an expedited manner. WVDEP shall give notice to Appellants' counsel of its certification of the milestones contained in the compliance schedule.

The modification of the remanded permits shall be considered a major modification and subject to the public notice provisions contained in the statute and regulations. Adversely affected parties and permittees shall have the opportunity to appeal the modification to this Board. In the event that an appeal of a modification is made, all appeals shall be scheduled and heard on an expedited basis. Failure to comply with the conditions of the compliance schedule shall be considered a violation of the permit. Pending the outcome of the revisions to these remanded permits, the existing permits, including the compliance schedule, and permit conditions shall be in effect.

Standing

The Board has twice concluded that Appellants have standing to pursue these appeals—once in response to Intervenor’s motions to dismiss and once in response to Intervenor’s motion for a directed verdict. (Bd.’s Order of 9/6/07) (Tr. Vol. II, p. 306, November 16, 2007). None of the evidence presented by Intervenor after the Board ruled on the motion for a directed verdict undermined the Board’s conclusion. Consequently, the issue of standing should be effectively resolved.

The Board is authorized by the legislature through statute to determine standing in proceedings before it. The Board reviews the question of standing to determine if the Appellant has been “adversely affected” by the decision of the WVDEP. The Intervenor’s argued a more restrictive review based on concepts of constitutional standing. Even under the more restrictive evaluation the Board finds that the Appellants have demonstrated standing to pursue these appeals.

Here, the West Virginia Legislature has adopted through statute and legislative rule strict statutory procedures for the modification of WV/NPDES permits and has provided parties like

Appellants a procedural vehicle through which parties can ensure compliance with those procedures. 47 C.S.R. § 30-8; W. Va. Code §§ 22B-1-7; 22-11-21. Here, through the testimony of their standing witnesses, Appellants have established that they have concrete recreational, aesthetic, and property interests in the streams affected by Petitioners' discharges. W. Va. Code §§ 22-11-21 provides Appellants with a procedure through which they can protect those interests from encroachment by unlawful DEP permitting decisions. Consequently, the standing requirements of immediacy of injury and redressability are not strict in these appeals.

Appellants presented the testimony of nine citizens of the State of West Virginia affected by discharges regulated under the challenged orders. Each of them told the story of the role that the streams have played in their lives and explained how selenium pollution from the regulated facilities (or the threat thereof) harms their aesthetic, recreational, and environmental interests. Specifically, through his testimony, Ron Wilkerson established that he is adversely affected by the compliance orders issued to the holders of WV/NPDES Permits WV1006029, WV1006118, and WV1018876. (Tr. Vol. I, p. 38-55, November 15, 2007). Betty Wiley established that she is adversely affected by the compliance orders issued to the holders of WV/NPDES Permits WV0040711 and WV0099015. (Id. at 56-100). James Tawney established that he is adversely affected by the compliance orders issued to the holders of WV/NPDES Permits WV0097144. (Id. at 101-08). Cindy Rank established that she is adversely affected by the compliance orders issued to the holder of WV/NPDES Permit Number WV0039471. (Id. at 109-24). Pauline Canterberry established that she is adversely affected by the compliance orders issued to the holder of WV/NPDES Permit Number WV1015848. (Id. at 125-138). Joan Linville established that she is adversely affected by the compliance order issued to the holder of WV/NPDES Permit Number WV1016890. (Id. at 139-52). Maria Gunnoe established that she is adversely affected

by the compliance order issued to the holders of WV/NPDES Permits WV0065889, WV1003887, WV1004140, WV1011120, WV1016024, and WV1004956. (Id. at 153-86). Vivian Stockman established that she is adversely affected by the compliance orders issued to the holders of WV/NPDES Permits WV0068764, WV0096962, WV1014684, WV0093912, WV1009311, WV1016440, WV1014780, and WV0099520. (Id. at 187-301). Finally, Turner Sharp established that he is adversely affected by the compliance order issued to the holder of WV/ NPDES Permit Number WV0094889. (Tr. Vol. II, p. 8-27, November 16, 2007). All of the standing witnesses established that they are members of the environmental groups that appealed the compliance orders. Consequently, Appellants have standing to maintain these appeals.

Permit Modification

The WV/NPDES rule for coal operations states that permit modification is appropriate when DEP determines that good cause exists for modification of a compliance schedule. Examples in the regulation of good cause include “an act of God, strike, flood, material shortages, or other events over which the permittee has little or no control and for which there is no reasonably available remedy.” W.Va. C.S.R. § 30.8.2.c.2.D. The rule’s reference to “strike” and “material shortage” implies that good cause goes beyond the unexpected natural catastrophe and extends to other unforeseen or unavoidable problems.

Here, WVDEP and the Intervenor have argued that until the turn of the century, around 2000, the coal industry and regulators did not realize that selenium in mine discharge was a problem. No evidence to the contrary has been offered and the Board finds that it is reasonable that the WVDEP would understand the regulations to give it authority to modify the compliance

order and therefore the permit. The Board agrees with WVDEP's actions in modifying the compliance schedule and the permit.

Because WVDEP deemed the modification a major modification the permits were required to comply with the public notice requirements of the regulations. The Appellant argued that WVDEP had to put the entire permit out for public notice rather than just the modification. The Board disagrees and finds the action of the WVDEP was appropriate when it placed the modified portions of the permit out for public notice.

The WVDEP failed to thoroughly follow the notice requirement when it did not send notice of its action to numerous government agencies as required by the regulation. In a ridiculous attempt to overcome this problem, the WVDEP mailed notice of its prior action on the first day of the evidentiary hearing in this matter. On November 14, 2007 specific notice was mailed to the following agencies: United States Fish & Wildlife Service field office in Elkins, West Virginia; United States Army Corps of Engineers, Huntington District; West Virginia Office of Air Quality; and West Virginia Department of Natural Resources. These agencies were provided 30 days to submit comments on the compliance orders. Ken Politan of the WVDEP testified that he understood that the agencies did not pay attention to the notices when received. Obviously, whether or not the agencies review the material is not significant. Although the remedy was more than six-months late, a remedy was provided, and the Board does not find this failure to be a reversible error. The Board warns that although in this instance the failure was not a reversible error, in the future it may be regarded as such.

NPDES Regulations For Coal and Non-Coal Facilities

The testimony has shown the Board that there is a glaring inconsistency between the coal and non-coal NPDES regulations. The non-coal regulations provide clear authority for granting

compliance schedules under specific circumstances with precise criteria to be achieved. The coal NPDES regulations are not as straight forward in this area. The coal NPDES regulations do not contain the same language and upon researching the legislative and administrative history of the regulations it is apparent that the regulations never contained the language.

EPA has concluded that compliance schedules can be issued when state regulations allow for their use. *In Re: Starkist Caribe, Inc.*, 3 E.A.D. 172, 1990 WL 324290 *6 (April 16, 1990). Accordingly, there is no federal impediment to the use of compliance schedules where, as in West Virginia, the state regulations provide for their use.

The WV/NPDES regulations provide for the use of compliance schedules when “necessary and appropriate.” The state rule governing the issuance of WV/NPDES permits to mining facilities includes the following paragraph: “The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA, Article 11, and rules promulgated thereunder.” W.Va. Code St. R. § 47-30.6.2.o.

The language used by the Legislature in W.Va. Code §22-11-6 has been interpreted by DEP and this Board to specifically authorize the issuance of “schedules of compliance” in appropriate circumstances. *West Virginia Rivers Coalition v. McClung*, Appeal No. 05-17-EQB and *PPG Industries, Inc. v. Director*, Appeal No. 05-18-EQB. This Board explicitly found in that appeal that “the West Virginia Water Pollution Control Act and promulgated Rules associated with the Act authorize the WVDEP to issue NPDES permits with compliance schedules . . .” *West Virginia Rivers Coalition*, at p. 10.

The coal WV/NPDES rule says “schedules of compliance for existing sources shall require compliance as soon as possible, but in no case later than the applicable statutory deadline: . . . July 1, 1977 for water quality based effluent limits under CWA Section

301(b)(1)(C).” W.Va. Code St. R. § 47-30-6.2.o.1. The coal WV/NPDES rule expressly prohibits compliance schedules for water quality standards already in effect before July 1, 1977, but neither expressly addresses nor prohibits compliance schedules for standards adopted after 1977.

The fact that the coal WV/NPDES rule does not expressly address whether compliance schedules can be used for standards adopted after July 1, 1977 does not mean that compliance schedules cannot be utilized by WVDEP in the coal WV/NPDES realm. W.Va. Code § 22-11-6 grants the WVDEP broad authority to issue compliance schedules when appropriate. Both the West Virginia Constitution and cases interpreting the state constitution clearly state that legislative statutes, which expressly authorize compliance schedules, cannot be eviscerated by an executive branch rule. W.V. CONST. art. V § 1; *See generally, Cooper v. Gwinn*, 298 S.E. 2d 781 (W.Va. 1981). Nothing in the coal WV/NPDES rule overrides W.Va. Code § 22-11-6 which expressly provides for the use of compliance schedules. Accordingly, WVDEP has the authority to include compliance schedules in permits issued to coal mining facilities under W.Va. Code St. R. § 47-30-1 *et seq.*

Anti-Backsliding

The original WV/NPDES permits issued to the Intervenor did not include any limit on selenium because the WVDEP was unaware that it could be or was present in the discharges at levels that could exceed the water quality standard of 5 ppb.

The WVDEP began including selenium limits in the WV/NPDES permits for coal mining operations soon after discovering that discharges from mine sites could contribute to high levels of selenium to certain streams in West Virginia. The WVDEP included interim and final selenium in the permits for existing facilities. The interim limits were effective for three years

from the date of permit issuance and imposed a “monitor only” requirement for that period. At the conclusion of the “monitor only” period, the final limits of 4.7 ppb for monthly average and 8.2 ppb for maximum daily were set to become effective.

The WVDEP issued the challenged compliance orders on April 5, 2007. No compliance order extending the length of the interim limits was issued to a permittee who held a permit with final effective limits for selenium. No final limit for selenium was replaced by an interim limit as a result of the WVDEP’s action.

De Facto Variance

The compliance orders do not modify the final limits for selenium in any of the permits. The effective date of the final limits for selenium is now April 5, 2010. The compliance schedules include benchmarks that the permittee must meet, including the submission of a treatment plan within one year of the effective date of the order.

Ken Politan testified that he did not foresee any future extension of these compliance schedules once the final limits become effective in 2010. He further testified that the WVDEP’s goal of reaching compliance by April 5, 2010 was reasonable. The Board finds that the WVDEP’s goal of reaching compliance by April 5, 2010 is not only reasonable it is essential.

The Board finds that with diligent research, investigation, and investment it is likely that some form of treatment will be available by 2010 that will allow the Intervenors to meet their final limits for selenium.

Use of Compliance Schedules by WVDEP

The Board finds that the inadequate research conducted by WVDEP and the Intervenors indicated that there was no effective treatment system available on the ground for selenium in 2007 when the WVDEP modified these permits. The Board further finds that the reasons for the

lack of an effective treatment technology, as noted above, are because the WVDEP and Intervenor have not worked hard enough to research, identify, and fund effective treatment technology. However, the Board finds that because no operative treatment system was identified by the Intervenor and the Appellee, the permittees could not achieve compliance by April 5, 2007.

CONCLUSIONS OF LAW

Standard of Review/Burden of Proof

1. The Board hears appeals of orders issued by Appellee in accordance with W. Va. Code § 22B-1-7.

2. The Board does not afford deference to the Director's decision, but rather, the Board acts independently on the evidence before it. W. Va. Division of Env'tl. Protection v. Kingwood Coal Co., 200 W. Va. 734, 745, 490 S.E.2d 823, 834 (1997).

3. When hearing appeals of DEP actions, this Board shall consider both the factors DEP was authorized to consider, "but also the economic feasibility of treating or controlling, or both, the discharge of solid waste, sewage, industrial wastes or other wastes involved." W. Va. Code, § 22B-1-7(h).

4. The West Virginia Water Pollution Control Act and its implementing regulations authorize WVDEP to issue compliance schedules "where necessary and proper" that allow a reasonable amount of time for a permittee to achieve compliance with a water quality standard or effluent limit. W. Va. Code § 22-11-6; *West Virginia Rivers Coalition v. McClung*, Appeal No. 05-17-EQB and 05-18-EQB, Conclusion of Law ¶ 6.

5. This broad grant of authority requires that WVDEP determine that it is "necessary and proper" to allow the permittee time to comply with a water quality standard or effluent limit

and that the agency specify a reasonable amount of time for the permittee to come into compliance.

6. The Board concludes that the WVDEP's decision to both issue the compliance orders and establish a three year compliance period was reasonable based on the following: the final limits for selenium remain in the permit, the inadequate research into available treatment technologies, the ongoing pilot studies, and that WVDEP could have reasonably selected 2010 in its original compliance schedules.

7. Under W. Va. Code § 22B-1-7(g), the Board "shall make and enter a written order affirming, modifying or vacating the order, permit or official action of the chief or secretary, or shall make and enter such order as the chief or secretary should have entered."

8. The WVDEP administers a federally-approved state program and is not charged with administering federal law. *See, generally West Virginia Coal Ass'n v. Bragg*, 248 F.3d 275 (4th Cir. 2001). Accordingly, the requirements of the West Virginia Water Pollution Control Act ("WPCA") and its associated regulations are the controlling law before this Board.

9. If WVDEP administers its State program in a manner that is inconsistent with federal law, then that is a matter to be taken up by USEPA and WVDEP pursuant to 33 U.S.C. § 1342(b) & (c).

10. Nevertheless, with regard to allegations that the challenged orders violate the CWA's "antibacksliding" provisions, the CWA section 402(o) limitation on relaxing a water quality-based limit in a subsequent permit only applies when the limit in the past permit has been "established" and the new limit is "comparable" to the limit in the previous permit. 33 U.S.C. § 1342(o)(1).

11. The Board concludes that there was never a final “established” limit in the permits. If the prior permit contains an unexpired compliance schedule for achieving an effluent limit, USEPA does not consider the “effluent limit” to have yet been “established” or become enforceable for the purposes of anti-backsliding.

12. Without an established final limit in effect, there can be no “backsliding.” In the present situation, the only permit limitation for selenium with which any of these permittees have ever had to comply is the “monitor only” requirement. The extension of this “monitor only requirement” until April 5, 2010 does not equal a relaxation of an effective limit because that permit limit has not changed. Moreover, the final limit has not been changed by any of the WVDEP’s actions.

De Facto Variances

13. Variances and compliance schedules are different instruments and serve different purposes. A variance is defined as:

any mechanism or provision under CWA Sections 301 or 316 or under 40 C.F.R. Part 125 or in the applicable effluent limitations guidelines which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of the CWA. This includes provisions which allow the establishment of alternative limitations based on fundamentally different factors or on CWA Sections 301(c), 301(g), 301(i), 302(b)(2), and 316(a).
W.Va. Code St. R. § 47-30-2.51.

The approval of a request for a variance results in a permit having a new limitation for the parameter or parameters that are the subject of the variance request. In this case, if a variance had been granted, the final effluent limit would not be the water quality-based effluent limit. All permits at issue in this Appeal, however, contain a final limit that is either the water quality-based effluent limit or based on a TMDL waste load allocation.

14. A compliance schedule does not modify the final permit limit but sets for a timeframe for the permittee to come into compliance with said final limit. The Clean Water Act defines a “schedule of compliance” to be “a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.” 33 U.S.C. § 1362(17).

15. The compliance orders are compliance schedules, not variances, because they are for a specific, reasonable amount of time, include benchmarks leading to compliance, and do not alter the final limits in the permits. Accordingly, the WVDEP did not need to go through the procedures for issuing a variance when issuing these compliance schedules.

16. This Board’s rationale in *West Virginia Rivers Coalition v. McClung*, Appeal No. 05-17-EQB and *PPG Industries, Inc. v. Director*, Appeal No. 05-18-EQB finding that the WVDEP had erred in including a compliance schedule in PPG’s permit does not apply to, and does not control, the present situation. Here, there is no evidence of an available technology proven effective at reducing selenium concentrations in mining discharges below the final permit level as there was for the mercury levels in the PPG appeal. Further, whereas PPG’s previous permit provided PPG with the time and opportunity to upgrade its treatment system, the previous compliance schedules for the permits at issue in this appeal did not convey the sense of urgency needed to require the permittees or the Appellee to develop an effective treatment system and install it.

17. Compliance schedules exist for a reasonable amount of time. A period of six years from when selenium was first included as a limit in permits—with no available technology for treatment—to when a brand new technology will be ready for industry-wide implementation, is reasonable. The WVDEP administers a federally-approved state program and is not charged

with administering federal law. *See, generally West Virginia Coal Ass'n v. Bragg*, 248 F.3d 275 (4th Cir. 2001). Accordingly, the requirements of the West Virginia Water Pollution Control Act (“WPCA”) and its associated regulations are the controlling law before this Board.

18. If WVDEP’s administers its State program in a manner that is inconsistent with federal law, then that is a matter to be taken up by USEPA and WVDEP pursuant to 33 U.S.C. § 1342(b) & (c).

Use of Compliance Schedules by WVDEP

19. EPA has concluded that compliance schedules can be issued when state regulations allow for their use. *In Re: Starkist Caribe, Inc.*, 3 E.A.D. 172, 1990 WL 324290 *6 (April 16, 1990). Accordingly, there is no federal impediment to the use of compliance schedules where, as in West Virginia, the state regulations provide for their use.

20. The WV/NPDES regulations provide for the use of compliance schedules when “necessary and appropriate.” The state rule governing the issuance of WV/NPDES permits to mining facilities includes the following paragraph: “The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA, Article 11, and rules promulgated thereunder.” W.Va. Code St. R. § 47-30.6.2.o.

21. The language used by the Legislature in W.Va. Code §22-11-6 has been interpreted by DEP and this Board to specifically authorize the issuance of “schedules of compliance” in appropriate circumstances. *West Virginia Rivers Coalition v. McClung*, Appeal No. 05-17-EQB and *PPG Industries, Inc. v. Director*, Appeal No. 05-18-EQB. This Board explicitly found in that appeal that “the West Virginia Water Pollution Control Act and promulgated Rules associated with the Act authorize the WVDEP to issue NPDES permits with compliance schedules . . .” *West Virginia Rivers Coalition*, at p. 10.

22. The coal WV/NPDES rule says “schedules of compliance for existing sources shall require compliance as soon as possible, but in no case later than the applicable statutory deadline: . . . July 1, 1977 for water quality based effluent limits under CWA Section 301(b)(1)(C).” W.Va. Code St. R. § 47-30-6.2.o.1. The coal WV/NPDES rule expressly prohibits compliance schedules for water quality standards already in effect before July 1, 1977, but neither expressly addresses nor prohibits compliance schedules for standards adopted after 1977.

23. The fact that the coal WV/NPDES rule does not expressly address whether compliance schedules can be used for standards adopted after July 1, 1977 does not mean that compliance schedules cannot be utilized by WVDEP in the coal WV/NPDES realm. W.Va. Code § 22-11-6 grants the WVDEP broad authority to issue compliance schedules when appropriate. Both the West Virginia Constitution and cases interpreting the state constitution clearly state that legislative statutes, which expressly authorize compliance schedules, cannot be eviscerated by an executive branch rule. W.V. CONST. art. V § 1; *See generally, Cooper v. Gwinn*, 298 S.E. 2d 781 (W.Va. 1981). Nothing in the coal WV/NPDES rule overrides W.Va. Code § 22-11-6 which expressly provides for the use of compliance schedules. Accordingly, WVDEP does have the authority to include compliance schedules in permits issued to coal mining facilities under W.Va. Code St. R. § 47-30-1 *et seq.*

24. Compliance schedules, once issued, can be modified just like any other part of a permit if good cause exists to do so. Good cause to modify a permit includes “an act of God, strike, flood, material shortages, or other events over which the permittee has little or no control and for which there is no reasonably available remedy.” W.Va. Code St. R. § 47-30.8.2.c.2.D. “Good cause” goes beyond the unexpected natural catastrophe and extends to other unforeseen

or unavoidable problems over which the permittee has no control and for which there is no “reasonably available remedy.”

Notice

25. The coal WV/NPDES rule requires that when a major permit modification is proposed, a draft permit is prepared. W.Va. Code St. R. § 47-30-10. During a permit modification, only the part of the permit being modified is open for comment. W.Va. Code St. R. § 47-30-10. Accordingly, the “draft permit” that the WVDEP prepares only includes the pages or sections of the permit being modified, not the entire permit. The Board concludes that the WVDEP fulfilled its obligation to prepare a draft permit by preparing the draft compliance orders.

26. The Board further concludes that the WVDEP’s failure to initially provide listed federal and state agencies with notice of the draft compliance orders did not result in reversible error. The WVDEP has cured this oversight and has expressed a willingness to consider comments from these agencies when and if received, even though it will be after the general public comment period.

Standing

27. Appellants have standing to prosecute these appeals.

28. The Board has twice before concluded that Appellants have standing to pursue these appeals—once in response to Intervenor’s motions to dismiss and once in response to Intervenor’s motion for a directed verdict. Bd.’s Order of 9/6/07; Transcript of 11/16/07 at 306.

29. None of the evidence presented by Intervenor after the Board ruled on the motion for a directed verdict undermined the Board’s conclusion.

30. Through the testimony of their standing witnesses, Appellants have established

that they have recreational, aesthetic, and property interests in the streams affected by Petitioners' discharges.

31. W. Va. Code §§ 22-11-21 provides Appellants with a procedure through which they can protect those interests from encroachment by unlawful DEP permitting decisions.

32. Consequently, the standing requirements of immediacy of injury and redressability are not as strict in these appeals as they might be in certain federal court actions.

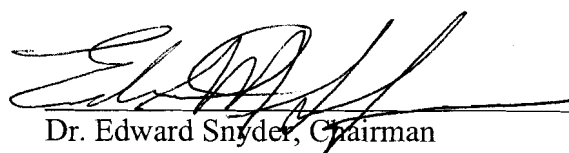
Conclusion

The Board hereby **ORDERS** that the Permits subject to this appeal are **REMANDED** back to WVDEP for changes consistent with this order. The WVDEP shall comply with the Board's order within thirty- days (30) of receipt of this order. Specifically the Board orders the WVDEP to review each of these permits, individually, and design a compliance schedule that is site and permit specific. The compliance schedule should include meaningful milestones and requirements to demonstrate what the permittee is doing to achieve compliance. The Board recommends two month time frames for reporting and the milestones should include but not be limited to the following: a review of the on the ground potential to release selenium; findings of fact specific to each site, literature review, bench scale studies and pilot studies, a list of contractors, number of employees and financial resources assigned to the task, and contingent plans for projects that fail to achieve compliance. The milestones contained in the permit and compliance schedule shall include a "certification" of conformity by WVDEP. Said certification shall be made by WVDEP within ten (10) business days after receipt. Failure of the WVDEP to act on the certification within ten business days is considered a failure to act that can be appealed to this Board and will be scheduled and heard on an expedited basis. Certification is considered an official agency action that can be appealed to this Board and will be scheduled and heard on

an expedited basis. WVDEP shall provide notice of its action taken on the certification of the milestones contained in the compliance schedule to the Appellants' counsel and the WVDEP's website.

The modification of the remanded permits shall be considered a major modification and subject to the public notice provisions contained in the statute and regulations. Adversely affected parties and permittees shall have the opportunity to appeal the modification to this Board. In the event that an appeal of any of the modifications is made, all appeals shall be scheduled and heard on an expedited basis. Failure to comply with the conditions of the compliance schedule shall be considered a violation of the permit. **Pending the ORDERED revisions to these remanded permits, the existing permits, including the compliance schedule, and permit conditions shall be in effect.**

It is so ORDERED this 12th day of June, 2008.



Dr. Edward Snyder, Chairman

Kevin Minoli/DC/USEPA/US

12/28/2010 09:06 AM

To Stefania Shamet

cc Carrie Traver, Christopher Hunter, Stephen Field

bcc

Subject Re: Revision to PD Response # 154

Fine with me to add this.
Revision to PD Response # 154

Revision to PD Response # 154

Stefania Shamet to: Christopher Hunter, Kevin Minoli

12/28/2010 07:15 AM

Cc: Stephen Field, Carrie Traver

(b) (5)



Christopher
Hunter/DC/USEPA/US
12/28/2010 09:11 AM

To Stefania Shamet
cc
bcc
Subject Re: Revision to PD Response # 154 -- OOPS! meant to
attach the decision.

Got it, thanks.

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Stefania Shamet

(b) (5)

12/28/2010 07:16:54 AM

From: Stefania Shamet/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA
Cc: Stephen Field/R3/USEPA/US@EPA, Carrie Traver/R3/USEPA/US@EPA
Date: 12/28/2010 07:16 AM
Subject: Revision to PD Response # 154 -- OOPS! meant to attach the decision.

(b) (5)

[Redacted]

[Redacted]

[Redacted]

Stefania
Shamet/R3/USEPA/US
12/28/2010 11:32 AM

To David Kargbo
cc Christopher Hunter, Dave Campbell, David Rider, Frank
Borsuk, John Forren, Kevin Minoli, Margaret Passmore,
Matthew Klasen, Stephen Field
bcc
Subject Re: HW RD Comments 1A-67A

Dave -- again, thanks. Any thoughts on 14A? Thanks again.

David Kargbo

Stef; (b) (5)

12/28/2010 10:42:20 AM

From: David Kargbo/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David
Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret
Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen
Field/R3/USEPA/US@EPA
Date: 12/28/2010 10:42 AM
Subject: Re: HW RD Comments 1A-67A

Stef;

(b) (5)



David M. Kargbo, PhD
Office of Environmental Innovation
Environmental Assessment and Innovation Division
USEPA Region 3
1650 Arch Street
Philadelphia, PA 19103
Tel: 215 814-3319 / E-mail: kargbo.david@epa.gov

Stefania Shamet

Matt -- as promised -- here are draft responses fr...

12/28/2010 06:52:38 AM

**Matthew
Klasen/DC/USEPA/US**
12/28/2010 11:52 PM

To Stefania Shamet
cc
bcc
Subject Current compiled RD comments

Hey Stef,


So here's the current draft, which I think will help your work on 68A and beyond. This is the full set of responses I've received so far, including all the Wheeling docs, Dave Kargbo's work, and also Erin's proposed responses and the edits you sent along earlier today. Greg Peck hasn't made it past the mitigation section, so there's no duplication of effort on this section.

As you can see, I've only made it through #110 on re-numbering and re-formatting to be consistent with the PD comments, so the numbering after that point is totally screwed up (starting again at #1). I'll keep working on the formatting and consistency front in the morning.

And as long as you use Track Changes, we shouldn't have any version control problems. Hope this version helps things a bit.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780

cell (202) 380-7229  - 2010-12-28 Compiled H&W Comments.docx

ATTACHMENT REDACTED - DELIBERATIVE

Ross
Geredien/DC/USEPA/US
12/28/2010 02:35 PM

To Christopher Hunter
cc Julia McCarthy, Palmer Hough
bcc
Subject Re: PD Responses to comments & some followup actions

(b) (5)

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Christopher Hunter What do think of this sentence to include? "Bas... 12/28/2010 02:28:22 PM

From: Christopher Hunter/DC/USEPA/US
To: Ross Geredien/DC/USEPA/US@EPA
Cc: Julia McCarthy/R8/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/28/2010 02:28 PM
Subject: Re: PD Responses to comments & some followup actions

What do think of this sentence to include?

(b) (5)

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Ross Geredien Chris, there are 116 miles of streams in Headwa... 12/27/2010 02:48:44 PM

From: Ross Geredien/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Julia McCarthy/R8/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/27/2010 02:48 PM
Subject: Re: PD Responses to comments & some followup actions

(b) (5)

-----Christopher Hunter/DC/USEPA/US wrote: -----

To: Ross Geredien/DC/USEPA/US@EPA
From: Christopher Hunter/DC/USEPA/US

Date: 12/27/2010 11:35AM

Cc: Julia McCarthy/R8/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA

Subject: Re: PD Responses to comments & some followup actions

I'd prefer to limit adding to their load if possible. It may be necessary in a couple of the cases, but see what you can come up with without asking them. If Christine is back in the office, she may be able to help with the watershed questions.

(b) (5)



Thanks

Chris Hunter

U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov

-----Ross Geredien/DC/USEPA/US wrote: -----

To: Christopher Hunter/DC/USEPA/US@EPA

From: Ross Geredien/DC/USEPA/US

Date: 12/27/2010 11:18AM

Cc: Julia McCarthy/R8/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA

Subject: Re: PD Responses to comments & some followup actions

Chris, a few initial responses and questions below.

To what extent can we go to the Wheeling staff for some of these answers, or are you trying to use them sparingly?

Ross

-----Christopher Hunter/DC/USEPA/US wrote: -----

To: Ross Geredien/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA

From: Christopher Hunter/DC/USEPA/US

Date: 12/27/2010 09:39AM

Subject: PD Responses to comments & some followup actions

(b) (5)



(b) (5) [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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(b) (5)

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

[attachment "Spruce PD comment responses 1-171 12-26-10.doc" removed by Ross
Geredien/DC/USEPA/US]

Frank Borsuk/R3/USEPA/US

12/28/2010 02:49 PM

To Stefania Shamet

cc

bcc Frank Borsuk

Subject Coalburg Seam clarification - - Re: HW RD Comments
1A-67A

Stef:

To provide information to 30(a), yes, the Coalburg seam is the coal seam located between the Stockton Coal Seam and Winifrede/Haddix Coal Seam. The coal seams in Southcentral west Virginia are laid out as follows:

.
. .

Stockton

Coalburg

Coalburg Rider

Middle Coalburg

Little Coalburg

Winifrede/Haddix Coal Seam

The Coalburg seam appears to be the same for Spruce No. 1 and Dal-Tex

Frank

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Fr
o Stefania Shamet/R3/USEPA/US

m:

To Matthew Klasen/DC/USEPA/US@EPA

:

Cc David Kargbo/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Christopher

:

Hunter/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA

Da 12/28/2010 06:52 AM


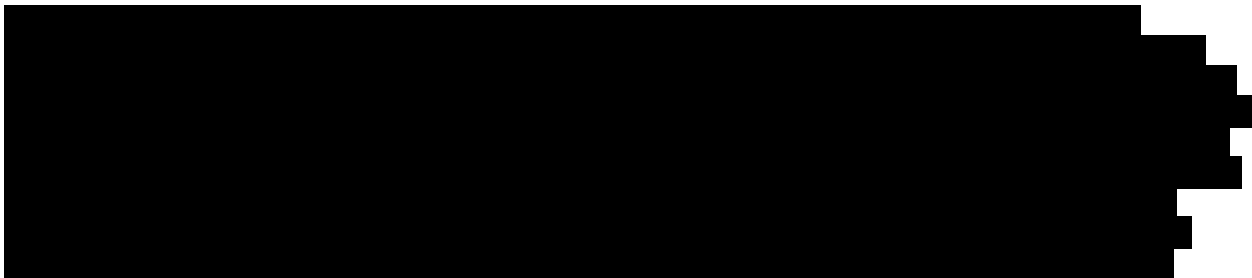
te:

Su HW RD Comments 1A-67A


bje

ct:

(b) (5)



(b) (5)



[attachment "Hunton-Williams Comments_1-68SDSCOMPARE.doc" deleted by Frank Borsuk/R3/USEPA/US]

Jim
Pendergast/DC/USEPA/US
12/28/2010 03:21 PM

To Gregory Peck
cc Denise Keehner, David Evans, Brian Frazer, Christopher
Hunter, Matthew Klasen
bcc
Subject Fw: Draft Spruce PR

Greg -- (b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

Jim

----- Forwarded by Jim Pendergast/DC/USEPA/US on 12/28/2010 03:10 PM -----

Fw: Draft Spruce PR

Christopher Hunter to: Tom Wall, Jim Pendergast, Lynda Hall,
Brian Frazer, David Evans 12/28/2010 10:07 AM

fyi -

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/28/2010 10:06 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora
Andy/DC/USEPA/US@EPA
Cc: stoner.nancy@epa.gov, Denise Keehner/DC/USEPA/US@EPA, Matthew
Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/28/2010 10:02 AM
Subject: Fw: Draft Spruce PR

Betsaida:

Hope you had (or are having) a great Christmas break. Am resending you the draft PR for the Spruce announcement in case you had not seen it. We're also working to prepare talking points, key messages, and Q's and A's which we'll get to you early next week. As we discussed - we're pointing to a Jan. 11 release.

Let us know if you have any questions.

Best,

Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/28/2010 09:56 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov
Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/19/2010 11:59 AM
Subject: Draft Spruce PR

Attached is an initial cut at a press release for the Spruce veto. Wanted to get you something early to begin chewing on (b) (5) ACP We'll be working on the remainder of the communications package during the next week, including Q's and A's, key messages, talking points, and outreach to coordinate support. Also working with Arvin and his staff. Shooting for a Dec 30th release.

We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-19 Draft Spruce Release v.1.docx

Jim
Pendergast/DC/USEPA/US
12/28/2010 03:27 PM

To Tom Wall
cc
bcc
Subject Fw: Draft Spruce PR

Tom -- (b) (5)

[REDACTED]

[REDACTED]

Jim

----- Forwarded by Jim Pendergast/DC/USEPA/US on 12/28/2010 03:24 PM -----

Fw: Draft Spruce PR

Jim Pendergast to: Gregory Peck

12/28/2010 03:21 PM

Cc: Denise Keehner, David Evans, Brian Frazer, Christopher Hunter, Matthew Klasen

Greg -- (b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

Jim

----- Forwarded by Jim Pendergast/DC/USEPA/US on 12/28/2010 03:10 PM -----

Fw: Draft Spruce PR

Christopher Hunter to: Tom Wall, Jim Pendergast, Lynda Hall,
Brian Frazer, David Evans

12/28/2010 10:07 AM

fyi -

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/28/2010 10:06 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA
Cc: stoner.nancy@epa.gov, Denise Keehner/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/28/2010 10:02 AM
Subject: Fw: Draft Spruce PR

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Greg

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To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov
Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/19/2010 11:59 AM
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We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-19 Draft Spruce Release v.1.docx

Frank Borsuk/R3/USEPA/US

12/28/2010 03:42 PM

To Stefania Shamet

cc borsuk.frank, David Rider, Margaret Passmore

bcc

Subject Response to 63(a) - Summary of WVDEP Fish Studies - Re:
HW RD Comments 1A-67A

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

(b) (5)

A large section of the document is redacted with black bars. The redaction covers approximately four lines of text. The first line is preceded by the text "(b) (5)".

The first report released in February 2009 was entitled: Selenium Bioaccumulation Among Select Stream and Lake Fishes in West Virginia. This report provided a study designed 'to elucidate the factors and impacts of selenium bioaccumulation among selected fish species, including bluegill sunfishes, found in the surface waters of West Virginia was warranted. This research emphasized the correlation of observed whole-body tissue concentrations of selenium in fishes to in-stream selenium quantities in both lotic and lentic environments, and comparison of those tissue concentrations to EPA's proposed whole-body chronic exposure tissue criterion of 7.91 Ug/g (dry weight selenium). Particular attention was given to the more susceptible sunfishes (family Centrarchidae) in regard to bioaccumulation; however, the bioaccumulation rates of many other species found in potentially impacted and reference aquatic systems were also researched. Site-specific water quality information, whole fish tissue concentrations, and bioaccumulation factors for selenium among select species of stream and lake fishes were derived from 18 locations (Fig. 1), beginning 1 November, 2005, and continuing to 20 July, 2007.'

The second report released in January 2010 was entitled: Selenium-Induced Developmental Effects Among Fishes in Selected West Virginia Waters. WVDEP provided a summary of this document as follows: 'In respect to the USEPA's draft whole fish tissue body burden criterion for selenium - 7.91 mg/kg dry weight (USEPA, 2004). potentially revised to 11.1 mg/kg dry weight (USEPA, 2008) - the West Virginia Department of Environmental Protection (WVDEP) has studied selenium bioaccumulation among fishes residing in the State's lakes and streams since 2005. Additionally, due to concern regarding fish population health at locations subjected to elevated selenium inputs, particularly during the more sensitive developmental life stages of fishes (e.g. yolk-sac larvae), the WVDEP has collected and examined bluegill sunfish, *Lepomis macrochirus*, larvae (ichthyoplankton) from selected waterbodies since 2007. Also, in 2009, WVDEP began acquiring data about selenium concentrations in fish eggs, which is often used as a

predictor of larval deformity rates (Lemly, 1997; Holm et al., 2005; Muscatello et al., 2006). Certain developmental deformities may also be observed among individuals surviving to later life stages (Nagano et al., 2007); consequently, WVDEP has conducted deformity surveys of adult fishes in selenium enriched waters as well as at reference locations since 2008.'

'Larval deformity rates were variable throughout the study duration but were nonetheless associated with waterborne selenium exposure. Reference locations produced age-based larval bluegill subsamples (24 - 168 hours) with deformity rates between 0% and 1.27%; whereas, locations with elevated seleniferous inputs exhibited bluegill ichthyoplankton deformity rates ranging from 0% to 47.56% in certain developmental stages (10 - 312 hours). However, these evaluations were not indicative of overall reproductive success or population sustainability, which must be determined via more detailed studies. Independent confirmation of selenium-induced larval deformities among bluegill populations sampled in 2008 was sought via collaboration with Dr. Diana Papoulias, Fish Research Biologist, United States Geological Survey (USGS), Columbia, MO, who verified the presence of developmental deformities. Maximum deformity rates among certain aged bluegill subsamples as determined through these evaluations were 19.28%, representing specimens collected from selenium-enriched waters. Concentrations of selenium within fish eggs also varied according to study location and ranged from <0.8 mg/kg dry weight among bluegill eggs at the control site to 64.62 mg/kg dry weight among largemouth bass, *Micropterus salmoides*, eggs collected from selenium-enriched waters. Searches for more mature, yet developmentally-deformed fishes revealed increased deformity rates (14%) among largemouth bass residing in the Upper Mud River Reservoir (UMMR), Lincoln County, West Virginia, as compared to deformity rates among largemouth bass found in the reference location (0%), Plum Orchard lake (POI), Fayette County, West Virginia.'

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

From: Stefania Shamet/R3/USEPA/US
m:

To: Matthew Klasen/DC/USEPA/US@EPA
:

CC: David Kargbo/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA

Date: 12/28/2010 06:52 AM
te:

Subject: HW RD Comments 1A-67A
bj
ct:

(b) (5)



(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

11/11/2016

[attachment "Hunton-Williams Comments_1-68SDSCOMPARE.doc" deleted by Frank Borsuk/R3/USEPA/US]

Julia McCarthy/R8/USEPA/US

To Christopher Hunter

12/28/2010 03:57 PM

cc

bcc

Subject Re: PD Responses to comments & some followup actions

Chris,
Revisions to the FD are coming in a subsequent email. Stupid G drive. Other responses are below.
Cheers,
Julia

Julia McCarthy
on detail to USEPA Headquarters
Office of Wetlands, Oceans and Watersheds
(202) 566-1660
mccarthy.julia@epa.gov

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a connection of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. ~Aldo Leopold

Christopher Hunter

(b) (5)

12/27/2010 09:39:47 AM

From: Christopher Hunter/DC/USEPA/US
To: Ross Geredien/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Palmer
Hough/DC/USEPA/US@EPA
Date: 12/27/2010 09:39 AM
Subject: PD Responses to comments & some followup actions

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce PD comment responses 1-171 12-26-10.doc" deleted
by Julia McCarthy/R8/USEPA/US]

Louis
Reynolds/R3/USEPA/US
12/28/2010 04:18 PM

To Margaret Passmore
cc David Rider, Greg Pond, John Forren, Matthew Klasen,
Stefania Shamet
bcc
Subject Re: DRAFT for 203, 204

ONE CHANGE IN PURPLE. Next to last paragraph: (b) (5).

Also, this is the paper that is cited in response, if it makes the cut:



Harding_etal_1998.pdf

Lou Reynolds
USEPA Region III
Freshwater Biology Team
1060 Chapline St. Ste. 303
Wheeling, WV 26003-2995
P 304-234-0244
F 304-234-0260

Margaret Passmore Stef and Matt Lou was kind enough to help with... 12/28/2010 03:57:40 PM

From: Margaret Passmore/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Louis
Reynolds/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Greg
Pond/R3/USEPA/US@EPA
Date: 12/28/2010 03:57 PM
Subject: DRAFT for 203, 204

Stef and Matt

Lou was kind enough to help with these.

(b) (5)

(b) (5)

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

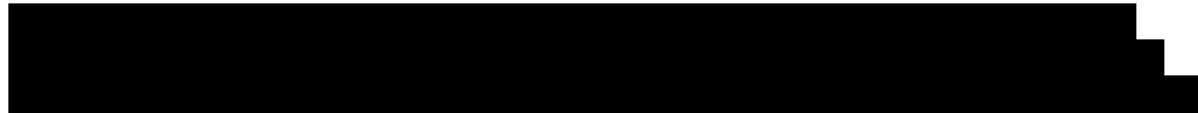
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)



Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Stream biodiversity: The ghost of land use past

J. S. HARDING^{*†‡}, E. F. BENFIELD^{*}, P. V. BOLSTAD[§], G. S. HELFMAN[¶], AND E. B. D. JONES III^{||}

^{*}Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061; [§]Department of Forest Resources, University of Minnesota, St. Paul, MN 55108-1027; [¶]Institute of Ecology, University of Georgia, Athens, GA 30602; and ^{||}CH2M Hill, 115 Perimeter Center Place, Atlanta, GA 30346-1278

Edited by George M. Woodwell, Woods Hole Research Center, Woods Hole, MA, and approved September 24, 1998 (received for review May 4, 1998)

ABSTRACT The influence of past land use on the present-day diversity of stream invertebrates and fish was investigated by comparing watersheds with different land-use history. Whole watershed land use in the 1950s was the best predictor of present-day diversity, whereas riparian land use and watershed land use in the 1990s were comparatively poor indicators. Our findings indicate that past land-use activity, particularly agriculture, may result in long-term modifications to and reductions in aquatic diversity, regardless of reforestation of riparian zones. Preservation of habitat fragments may not be sufficient to maintain natural diversity in streams, and maintenance of such biodiversity may require conservation of much or all of the watershed.

Conservation of species diversity at local, regional, and continental scales has received increasing attention as human disturbance and modification of ecosystems increase. Our understanding of the magnitude of species decline is clearest for vertebrates in terrestrial, marine, and lake ecosystems (1–4). In contrast, empirical evidence of extirpations and extinctions of invertebrate species in lotic (running water) ecosystems is comparatively sparse (1–9). Worldwide, many rivers and streams have been profoundly modified by urban and agricultural development, impoundment, channelization, resource-extraction projects, and pollution. In many regions, such as the southern Appalachian Mountains, reforestation of previously cleared watersheds is occurring as agriculture becomes less important to the local economy (10, 11). This process of reforestation allows us to ask: to what extent are the effects of human disturbance reversible, and how long does recovery take? Although recovery and restoration of the physical habitat is often possible, the degree to which biological communities can recover from long-term disturbance is still relatively unknown.

Stream ecologists have long recognized the strong dependence of streams on the surrounding terrestrial environment (12–15). The riparian zone bordering streams serves as a buffer between the stream and the surrounding watershed and is also the primary source of organic matter for many small streams in forested biomes (12–15). Conditions in the riparian zone, therefore, strongly influence stream hydrology, substrate characteristics, temperature regimes, and water chemistry, which in turn affect all trophic levels. Considerable emphasis has been placed on protection or revegetation of riparian zones as a tactic for preserving aquatic ecosystems (16, 17). The presence of natural vegetation in riparian zones has been shown to improve stream hydrology, water quality, and reduce sedimentation in disturbed watersheds (18–20). However, by emphasizing restoration of riparian zones, land managers assume that stream conditions across the whole catchment can be mitigated

by attention only to land adjacent to the stream. This assumption is not supported by recent studies (21, 22).

The overall objective of the present study was to investigate relationships between land use and invertebrate and fish diversity in streams. We used two approaches in the study. The first was to compare diversity in streams that drain agricultural land to diversity in streams that drain forested land. The second was to examine the land-use history associated with the streams to look for clues that might help explain present-day diversity patterns. To achieve these aims, we investigated 24 tributary watersheds ranging from 1,750 to 40,700 ha in size in two river basins, the Little Tennessee and the French Broad Rivers, in western North Carolina. Of the 12 watersheds chosen within each basin, 6 were currently primarily forested and 6 were agricultural. Land use in these 24 watersheds was assessed by determining the percentage of the watershed in forest at seven spatial scales for the 1950s and 1990s and was calculated from Geographic Information System overlays constructed from topographic maps, aerial photographs, and satellite imagery from the 1950s and 1990s. The seven spatial scales selected included both different riparian widths and longitudinal distances along the stream continuum as follows: (i) land use over the entire watershed; (ii) land use within a 30-m riparian zone of the stream (for the entire length of the stream); (iii) land use within a 100-m riparian zone of the stream (for the entire length of the stream); (iv) land use within a 30-m riparian zone of the stream (up to 1 km upstream of the sampling site); (v) land use within a 30-m riparian zone of the stream (up to 2 km upstream of the sampling site); (vi) land use within a 100-m riparian zone of the stream (up to 1 km upstream of the sampling site); and (vii) land use within a 100-m riparian zone of the stream (up to 2 km upstream of the sampling site).

At each of the 24 streams, random benthic invertebrate samples were collected in 1995–1996 from riffles along a 10-m reach. A modified quantitative kick net (0.4 m²; 250- μ m mesh) was used to collect five samples, and a qualitative sample was taken from a range of microhabitats within the reach. Fish were sampled by electroshocking and seining a 50-m reach, including a riffle-pool complex. Fish samples were taken at each site during spring and fall of 1995 and 1996. Comparisons of diversity and land-use data were made with multiple regression models, and stepwise regression analysis was used to identify the combination of history and spatial land use acquired from the Geographic Information System that best explained the diversity of stream invertebrates and fishes. Invertebrate assemblages for each of the 24 streams were also compared by detrended correspondence analysis (DCA; ref. 23).

This paper was submitted directly (Track II) to the *Proceedings* office. Abbreviations: DCA, detrended correspondence analysis; EPT, number of Ephemeroptera, Plecoptera, and Trichoptera taxa.

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Streams in 1990s forested watersheds were generally >90% forested in the 1950s. However, streams in 1990s agricultural watersheds in the Little Tennessee Basin averaged $\approx 60\%$ forest in the 1950s, whereas those in the French Broad Basin averaged $\approx 30\%$ forest (Fig. 1).

In both river basins, significant differences in both faunal diversity and assemblage composition were observed between agricultural and forested streams. Invertebrate taxonomic richness and other analogs of diversity [Margalef's Index and the number of Ephemeroptera, Plecoptera, and Trichoptera taxa (EPT)] were significantly greater in forested streams than in agricultural streams in both river basins (Table 1). In contrast, invertebrate density did not differ significantly between current land-use types. Fish assemblages showed a different trend; the total number of fish species, Margalef's index, and total abundance were significantly greater in agricultural streams than in forested ones (Table 1). Fish diversity was greater where trout were absent and where species tolerant of sedimentation were favored. We found a significant negative correlation between fish-species diversity and trout abundance ($n = 24$ streams; $P < 0.001$; >99% of trout were introduced rainbow and brown trout, and <1% were native brook trout). Substrate analysis of percentage of fine sediments indicated greater quantities in agricultural than forested streams (M. Paul and J. Meyer, personal communication), and sedimentation seemed to be linked to a reduced abundance of fishes belonging to the crevice-spawning reproductive guild (G.S.H., unpublished data).

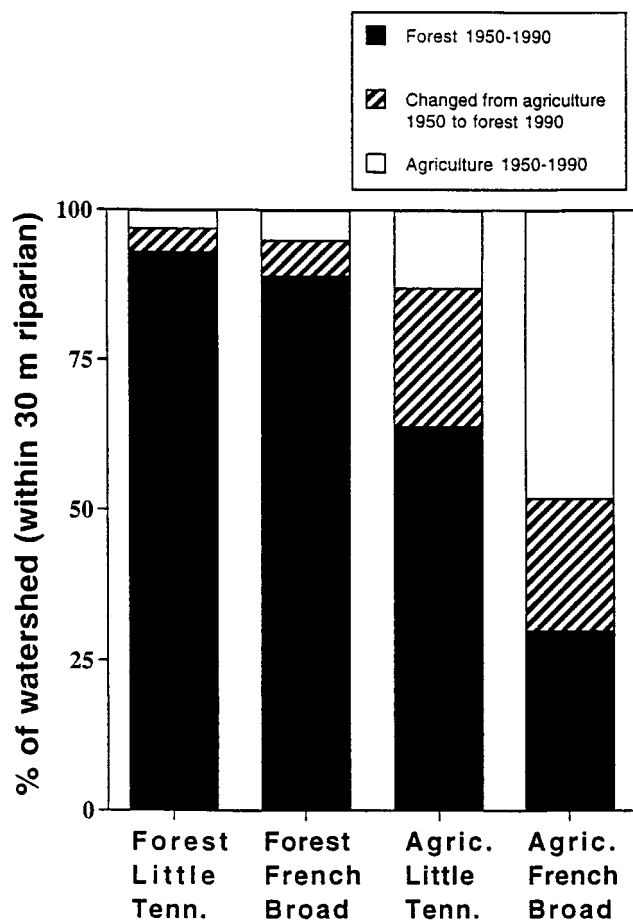


FIG. 1. Percentage of watershed (within a 30-m riparian zone) in different land uses in the 1950s and 1990s. Each column represents six watersheds characterized by 1990s land use in the basins of the Little Tennessee and the French Broad Rivers (data assessed from the Geographic Information System).

Regressions of diversity and watershed conditions across time and space showed that land use in the 1950s was usually the best indicator of present-day diversity. When data from both basins were combined, the best single model for explaining invertebrate taxonomic richness was land use across the entire watershed in the 1950s (Table 2). A stepwise regression of DCA Axis 1 values was carried out against the 14 time and space Geographic Information System values for percentage of each watershed in forest ($r^2 = 0.56$; $F = 28.42$; $P < 0.001$). Therefore when considered separately, the French Broad Basin, which experienced greater agricultural development in the past, generally showed stronger links to the past than agricultural watersheds in the Little Tennessee Basin.

Land-use conditions in the 1950s in the 30-m riparian zone were the best predictors of invertebrate diversity, as measured by Margalef's Index, the North Carolina Biotic Index, and EPT values (which account for disturbance-sensitive taxa) in combined basins (Table 2). Again, when analyzed separately, land use in the historically more developed French Broad Basin showed consistently stronger regression values than in the Little Tennessee Basin. Invertebrate density was only weakly correlated with land-use patterns; the strongest predictor was land use in the 1990s in the 100-m riparian zone, within 1 km upstream of the sampling sites (Table 2). The best single variable models for fish species richness, diversity (Margalef's index), and abundance in both the combined basins and in the Little Tennessee were 1950s land use at various spatial scales. However, species richness and diversity in the French Broad basin alone were best explained by more localized land-use data in the 1990s (Table 2). Finally, 1950s watershed conditions best explained combined fish and invertebrate diversity across all watersheds.

These findings support our assertion that in currently forested watersheds, historic land-use data may be more useful indicators than present land use in predicting taxonomic diversity. Furthermore, our findings indicate that large-scale and long-term agricultural disturbances in a watershed limit the recovery of stream diversity for many decades.

Legacies of land use also help to explain the current composition of invertebrate assemblages in the study streams. Multivariate analysis incorporating invertebrate assemblage data for all streams shows that forested and agricultural streams differ in taxonomic composition, with the exception of two forested streams (Fig. 2). Both of these streams drain watersheds that were 92% forested in the 1990s, but the invertebrate assemblages more closely resemble those of agricultural streams (Fig. 2). The best predictor of invertebrate composition in these two forested streams was land use in the 1950s in the 30-m riparian zone up to 2 km upstream of the sampling site. In the 1950s, the two forested streams were embedded in a landscape with high percentages of riparian agriculture (43% and 44%). These two streams were also anomalous with respect to fish species composition, having assemblages more similar to the agricultural streams than other forested streams. These forested sites contained 15 and 14 fish species, 12 of which they held in common. Of these 12 species, 5 occurred at no other forested stream, whereas 4 of these 5 were recorded in at least one agricultural stream. Sculpin and trout were absent at both of these streams and were essentially absent from five of six agricultural streams, but they were abundant at the other French Broad forested streams. The mean Jaccard similarity coefficient between these two anomalous streams and the other French Broad forested streams was 0.16, and for these streams and the French Broad agricultural streams it was 0.32. The two means were significantly different (t test; $df = 78$; $P < 0.001$), indicating that these forested streams were more similar to agricultural than to other forested streams.

Reforestation of the riparian zone over the last 47 years has resulted in little effective recovery of the fauna of these

Table 1. Mean diversity for forested and agricultural streams in the Little Tennessee and French Broad Rivers

Diversity indices	Forest (L. Tennessee)		Forest (Fr. Broad)		Agriculture (L. Tennessee)		Agriculture (Fr. Broad)		Land use		River basin	
									<i>F</i>	<i>P</i>	<i>F</i>	<i>P</i>
Invertebrates												
Taxonomic richness	59.3 ±	3.6	59.7 ±	7.9	48.7 ±	3.6	39.0 ±	5.4	8.25	**	0.73	n.s.
Margalef's index	7.9 ±	0.4	8.1 ±	0.9	6.2 ±	0.4	5.2 ±	0.6	12.86	**	0.46	n.s.
EPT	40.5 ±	3.4	45.2 ±	6.7	32.0 ±	3.4	25.0 ±	4.4	9.34	**	0.06	n.s.
NCBI†	2.7 ±	0.1	2.5 ±	0.1	3.3 ±	0.2	3.4 ±	0.2	28.14	**	0.02	n.s.
Invertebrate density	1858 ±	496	1441 ±	211	2635 ±	758	3015 ±	1958	1.17	n.s.	0.01	n.s.
Fishes												
Species richness	14.5 ±	3.3	11.7 ±	1.7	23.2 ±	1.2	16.8 ±	2.3	9.22	**	4.56	*
Margalef's index	4.4 ±	0.9	3.7 ±	0.5	6.7 ±	0.4	4.7 ±	0.6	6.33	*	4.04	n.s.
Fish abundance	1096 ±	256	757 ±	149	2212 ±	354	1772 ±	377	12.76	**	1.70	n.s.
Fish + invertebrate species richness	73.8 ±	4.3	71.3 ±	7.2	71.8 ±	3.3	56.2 ±	7.2	2.21	n.s.	2.48	n.s.

Mean diversities are given ±SE ($n = 6$). Results of two-way ANOVA are shown, with Tukey's test for land use (all forest vs. agriculture combined) and river basin (all Little Tennessee vs. French Broad) treatments. (*, $P < 0.05$; **, $P < 0.01$; n.s., not significant; NCBI, North Carolina Biotic Index.)

streams to predisturbance conditions. Current stream restoration philosophy and policy supports the idea that recovery of stream fauna can occur relatively rapidly after short-term natural and human disturbances when riparian conditions are returned to a predisturbance state (24–26). Our data suggest that recovery requires decades.

The difference in response between invertebrate and fish diversity may be caused by a stronger dependence of invertebrates (especially EPT taxa) on the presence of a relatively

stable, sediment-free streambed (27–29). As well as differences in overall fish diversity, we found that fishes dependent on the streambed for foraging or breeding (e.g., some minnows, sculpins, and darters) were replaced in agricultural streams by species that dwell in the water column or those that clean sediment from their nests (e.g., other minnows and sunfishes).

Our findings challenge assumptions about both the maintenance and future recovery of biodiversity in disturbed stream

Table 2. Multiple regression analyses of measures of diversity against percentage of the watershed in forest at 14 different spatial scales and at two time periods

Basins		Time and spatial watershed scales	r^2	<i>F</i>	<i>P</i>
Invertebrates					
Taxonomic richness	Combined river basins	1950-WS	0.56	27.9	**
	French Broad River	1950-WS	0.67	21.09	**
	Little Tennessee River	1950-1k-30	0.28	4.03	n.s.
Margalef's index	Combined river basins	1950-WS-30	0.59	31.2	**
	French Broad River	1950-WS	0.69	22.77	**
	Little Tennessee River	1950-1k-100	0.53	11.23	**
EPT	Combined river basins	1950-WS-30	0.51	22.9	**
	French Broad River	1950-WS	0.69	22.94	**
	Little Tennessee River	1950-WS	0.25	3.37	n.s.
NCBI†	Combined river basins	1950-WS-30	0.51	22.3	**
	French Broad River	1950-WS-100	0.73	27.04	**
	Little Tennessee River	1990-1k-100	0.40	6.88	*
Invertebrate density	Combined river basins	1990-1k-100	0.23	6.8	*
	French Broad River	1990-1k-30	0.36	5.86	*
	Little Tennessee River	1990-1k-100	0.22	2.87	n.s.
Fishes					
Species richness	Combined river basins	1950-2k-30	0.37	12.7	**
	French Broad River	1990-1k-100	0.47	9.08	*
	Little Tennessee River	1950-WS	0.53	11.33	**
Margalef's index	Combined river basins	1950-2k-30	0.27	8.3	**
	French Broad River	1990-1k-100	0.32	4.79	n.s.
	Little Tennessee River	1950-WS	0.45	8.30	*
Fish abundance	Combined river basins	1950-1k-100	0.46	19.4	**
	French Broad River	1950-2k-100	0.40	6.88	*
	Little Tennessee River	1950-2k-100	0.67	20.82	**
Total fish + invertebrate taxa	Combined river basins	1950-WS	0.46	18.4	**
	French Broad River	1950-WS	0.56	12.82	**
	Little Tennessee River	1990-WS-30	0.07	0.75	n.s.

Combined river basins analysis consists of data for 24 watersheds, whereas French Broad and Little Tennessee River data are for 12 watersheds in their respective basins. Only best single variable models are shown. (WS, land use over the entire watershed; 1k, land use up to 1 km upstream from the sampling reach; 2k, land use up to 2 km upstream from the sampling reach; 30, land use within a 30-m riparian buffer zone of the stream; 100, land use within a 100-m riparian buffer zone of the stream; * $P < 0.05$; ** $P < 0.01$; n.s., not significant.)

†North Carolina Biotic Index

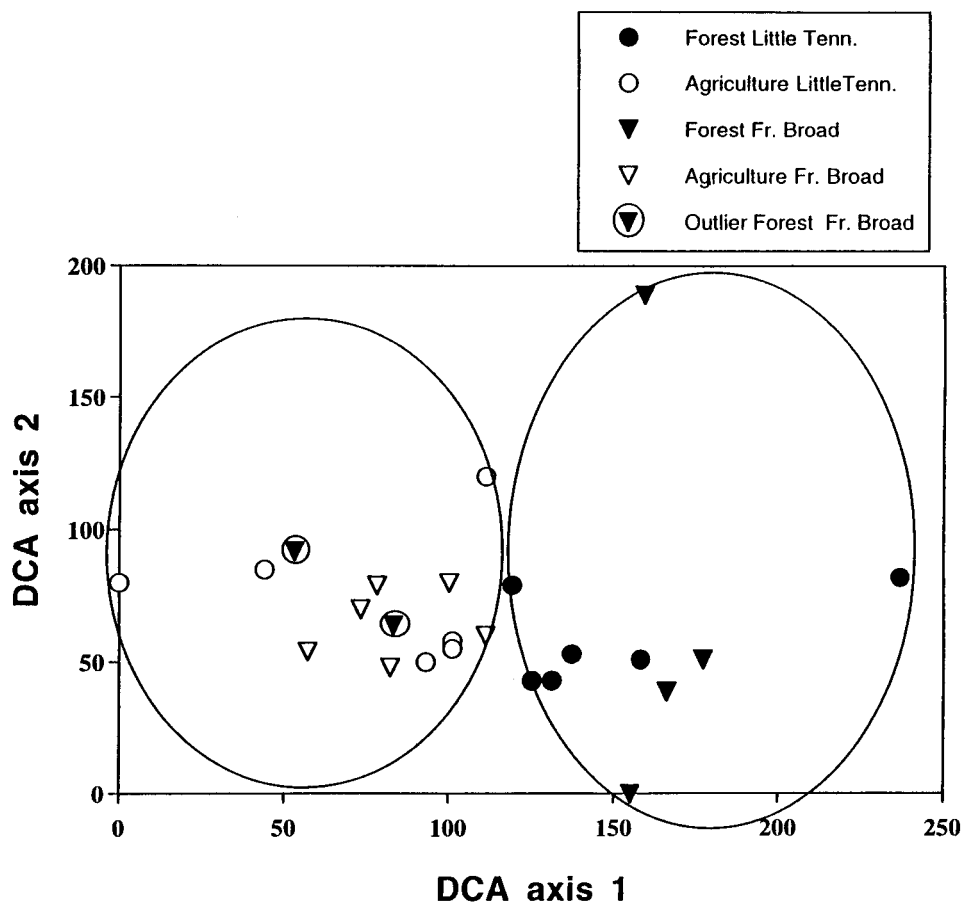


FIG. 2. DCA of invertebrate assemblages based on presence/absence data for the 24 watersheds in two river basins. Streams are grouped into two general clusters, forested and agricultural streams (as indicated by the ellipses). Two outlier forested streams within the agricultural cluster represent streams that today lie in forested watersheds but were in partially agricultural watersheds in the 1950s.

ecosystems. Studies of the recovery of stream assemblages after short-term catastrophic disturbances (e.g., experimental manipulation, floods, logging, construction, and point-source pollution) have often shown relatively rapid recovery of biotic communities (30–35), and these findings have provided the cornerstone of accepted theory and policy. However, high impact or sustained anthropogenic disturbance, such as sustained agriculture, may profoundly alter biotic communities, and the effects of this disturbance may be persistent. Few studies have assessed recovery from prolonged disturbance or scrutinized changes from a multiple-watershed perspective.

Current land-management practices often operate on the assumption that economic activity within a catchment can proceed as long as riparian zones are preserved (36, 37). Riparian zones have been used effectively to mitigate the adverse effects of many land-use practices, but our understanding of the linkages among ecological processes that shape biodiversity, biotic communities, and watershed conditions is far from complete. In addition to understanding the value of intact riparian zones, our results support the view that conservation of natural ecosystems may require preservation of the entire watershed—not just fragments of it as many current policies assume. In terrestrial systems, the influence of forest-fragment size on biodiversity has been investigated intensively (38). In contrast, this issue has been largely ignored in stream systems; however, our results indicate that the amount of forest and possibly forest size may be critical in influencing stream biota.

Our findings provide new insights into possible causes of variability in the diversity and composition of aquatic assemblages. Data from studies of multiple streams are often highly

variable and difficult to interpret. Our results suggest that some of this variability may be a legacy of land use, which is often unrecorded or unknown.

Finally, our study provides evidence of the importance of past land use as a determinant of present species diversity in streams. Exploitation and development of natural watersheds is continuing worldwide. We suggest that disturbance of these systems, which in our study involved the conversion of forest to agriculture, may result in substantial long-term modifications and reductions in natural biodiversity. Realization of the potential alteration or loss of biodiversity from watershed-wide land use should provide a warning for conservation organizations and policy makers alike.

We thank B. Bennett, R. H. Jones, M. McTammany, L. Martin, J. L. Meyer, M. Neatrou, M. J. Paul, H. R. Pulliam, K. Simon, J. L. Tank, P. Wagner, and J. R. Webster for constructive comments. J. Harper, H. Pape, and M. Scott provided assistance with data collection and analysis. This research was supported by National Science Foundation Division of Environmental Biology Grants 9011661 and 9416803.

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Julia McCarthy/R8/USEPA/US

To Christopher Hunter

12/28/2010 04:36 PM

cc

bcc

Subject Revised FD

Chris,
Here's the FD with some revisions.
Cheers,
Julia



ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD 122810 draft.doc

Julia McCarthy
on detail to USEPA Headquarters
Office of Wetlands, Oceans and Watersheds
(202) 566-1660
mccarthy.julia@epa.gov

A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a connection of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity. ~Aldo Leopold

**Matthew
Klasen/DC/USEPA/US**
12/28/2010 06:06 PM

To Matthew Klasen
cc
bcc
Subject Spruce



mk 2010-12-28 Compiled H&W Comments.docx



MNK PARS 2010.doc



2010-12-22 Compiled H&W Comments.docx

ATTACHMENTS REDACTED - DELIBERATIVE

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Gregory Peck/DC/USEPA/US

12/29/2010 09:27 AM

To

cc Adora Andy, Betsaida Alcantara, Brendan Gilfillan, Christopher Hunter, Denise Keehner, (b)(6) Kevin , Matthew Klasen, stoner.nancy

bcc

Subject Re: Fw: Draft Spruce PR

Betsaida

Attached is an updated version of the draft Spruce Press Release. Please let us know if you have any questions.

Best,
Greg



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Draft Spruce Release v.2.docx

Gregory Peck

Betsaida: Hope you had (or are having) a great...

12/28/2010 10:02:17 AM

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA
Cc: stoner.nancy@epa.gov, Denise Keehner/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, (b)(6) Kevin Minoli
Date: 12/28/2010 10:02 AM
Subject: Fw: Draft Spruce PR

Betsaida:

Hope you had (or are having) a great Christmas break. Am resending you the draft PR for the Spruce announcement in case you had not seen it. We're also working to prepare talking points, key messages, and Q's and A's which we'll get to you early next week. As we discussed - we're pointing to a Jan. 11 release.

Let us know if you have any questions.

Best,
Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/28/2010 09:56 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov
Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b)(6) Kevin Minoli
Date: 12/19/2010 11:59 AM
Subject: Draft Spruce PR

Attached is an initial cut at a press release for the Spruce veto. Wanted to get you something early to begin chewing on. (b) (5) ACP We'll be working on the remainder of the communications package during the next week, including Q's and A's, key messages, talking points, and outreach to coordinate support. Also working with Arvin and his staff. Shooting for a Dec 30th release.

We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg

[attachment "2010-12-19 Draft Spruce Release v.1.docx" deleted by Gregory Peck/DC/USEPA/US]

Carrie Traver/R3/USEPA/US
12/29/2010 09:37 AM

To Christopher Hunter, Margaret Passmore, Palmer Hough,
Louis Reynolds, Stefania Shamet
cc
bcc
Subject References in the FD

I skimmed through the FD and the Appendices. Here is the list of references cited in the FD that I don't have in the reference list, by page:

P10 (footnote) - Stoddard et al 2006
P17 - Slate et al 2007
Simon et al 2007
Tullos et al 2009
P23- Leopold et al 1964, Ensign and Doyle 2006
P24- EPA 2003
P29 & 63- Baxter et al 2005
P35- Fauch 1984
P38- Smith 2010
P39- Robbins 1989 (This doesn't match up with the Robbins citations we have, including 1979, 1980 and et al 1992)
Rosenberg et al 2000 (Is this 2002?)
P40- WVDNR 2010
USFWS 2005
P63- Easton et al 1996
P66- Unpublished data, WVDEP

Also attached is a copy of the FD with a few edits.



ATTACHMENT REDACTED - DELIBERATIVE

Spruce_FD_122710_draft[1].doc

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

ESC	Spruce Mine Data and References - Environmen...	12/28/2010 12:48:46 PM
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From: ESC@EPA
To: Gwen Arnold/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, Kristopher DeNardi/R3/USEPA/US@EPA, Mark Douglas/R3/USEPA/US@EPA, Michael Dunn/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Jennifer Fulton/R3/USEPA/US@EPA, Gregory Gies/R3/USEPA/US@EPA, Joy Gillespie/R3/USEPA/US@EPA, Nancy Grundahl/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Bill Jenkins/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Matthew Lee/R3/USEPA/US@EPA, Michael Mansolino/R3/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Richard Paiste/R3/USEPA/US, Margaret Passmore/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Charles Rhodes/R3/USEPA/US, David Rider/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Carrie Traver/R3/USEPA/US@EPA
Date: 12/28/2010 12:48 PM

Subject: ESC Project Update: Spruce Mine Data and References/ New resources added by Christopher Hunter

Spruce Mine Data and References - Environmental Science Connector Update

Christopher Hunter has added the following resources to the Spruce Mine Data and References project.

- Appendix 5 Cumulative Impacts 122810

The resources were added in the Spruce Mine Data and References \ Final Determination drafts folder.

[Review Spruce Mine Data and References project](#)

The search feature can be used to quickly locate these resources by searching on title or today's date.

If you do not wish to receive email notifications for this project, please go to the [ESC My Profile Page](#) to change your notification preferences.

Environmental Science Connector • <http://portal.epa.gov/ESC>

Christopher
Hunter/DC/USEPA/US
12/29/2010 10:05 AM

To Margaret Passmore
cc John Forren, Stefania Shamet
bcc
Subject Re: one last revision for the conductivity model

Got it. Thank you.

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Margaret Passmore almost. see attached. Margaret Passmore Fre... 12/29/2010 09:12:33 AM

From: Margaret Passmore/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 09:12 AM
Subject: Re: one last revision for the conductivity model

almost. see attached.

[attachment "Appendix 1 Water Quality & Wildlife 122810_MP_122910b.doc" deleted by Christopher Hunter/DC/USEPA/US]

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Christopher Hunter Thanks Maggie. Please take a look at the chang... 12/29/2010 08:49:06 AM

From: Christopher Hunter/DC/USEPA/US
To: Margaret Passmore/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 08:49 AM
Subject: Re: one last revision for the conductivity model

Thanks Maggie. Please take a look at the changes and let me know what you think.

Chris
[attachment "Appendix 1 Water Quality & Wildlife 122810.doc" deleted by Margaret

Passmore/R3/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Margaret Passmore

Chris, (b) (5)

12/29/2010 08:20:19 AM

From: Margaret Passmore/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Stefania Shamet/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Date: 12/29/2010 08:20 AM
Subject: one last revision for the conductivity model

Chris,

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[attachment "Appendix_1_Water_Quality_&_Wildlife_12-28-10[1]_MP_122910.doc" deleted by Christopher Hunter/DC/USEPA/US]

Margaret Passmore
Freshwater Biology Team
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Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

To Stefania Shamet

cc Christopher Hunter, Dave Campbell, David Rider, Frank Borsuk, John Forren, Kevin Minoli, Margaret Passmore, Matthew Klasen, Stephen Field

bcc

Subject Re: HW RD Comments 1A-67A

Great job. Dave.

Re: HW RD Comments 1A-67A

Re: HW RD Comments 1A-67A

Stefania Shamet to: David Kargbo

12/29/2010 05:15 AM

Cc: Christopher Hunter, Dave Campbell, David Rider, Frank Borsuk, John Forren, Kevin Minoli, Margaret Passmore, Matthew Klasen, Stephen Field

(b) (5)

(b) (5)

[REDACTED]

[REDACTED]

(b) (5)



David Kargbo

Stef; (b) (5)

12/28/2010 01:38:32 PM

From: David Kargbo/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/28/2010 01:38 PM
Subject: Re: HW RD Comments 1A-67A

Stef;

(b) (5)



Dave

David M. Kargbo, PhD
Office of Environmental Innovation
Environmental Assessment and Innovation Division
USEPA Region 3
1650 Arch Street
Philadelphia, PA 19103
Tel: 215 814-3319 / E-mail: kargbo.david@epa.gov

Stefania Shamet

Dave -- again, thanks. Any thoughts on 14A? Th...

12/28/2010 11:32:03 AM

From: Stefania Shamet/R3/USEPA/US
To: David Kargbo/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen

Field/R3/USEPA/US@EPA
Date: 12/28/2010 11:32 AM
Subject: Re: HW RD Comments 1A-67A

Dave -- again, thanks. Any thoughts on 14A? Thanks again.

David Kargbo Stef; In Response #60A in the attached file, I ha... 12/28/2010 10:42:20 AM

From: David Kargbo/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/28/2010 10:42 AM
Subject: Re: HW RD Comments 1A-67A

Stef;

In Response #60A in the attached file, I had also provided the following analysis (that was not included in

(b) (5) [REDACTED]

[REDACTED]

David M. Kargbo, PhD
Office of Environmental Innovation
Environmental Assessment and Innovation Division
USEPA Region 3
1650 Arch Street
Philadelphia, PA 19103
Tel: 215 814-3319 / E-mail: kargbo.david@epa.gov

Stefania Shamet (b) (5) 12/28/2010 06:52:38 AM

From: Stefania Shamet/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: David Kargbo/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA
Date: 12/28/2010 06:52 AM
Subject: HW RD Comments 1A-67A

(b) (5)



Thanks.

[attachment "Hunton-Williams Comments_1-68SDSCOMPARE.doc" deleted by Stefania Shamet/R3/USEPA/US]

Julia McCarthy/R8/USEPA/US

To Christopher Hunter

12/29/2010 10:25 PM

cc

bcc

Subject Spruce

Hey Chris,

Here are my comments - most are minor. (b) (5)


If you need any clarification, just give a holler - my cell works at the beach house. Otherwise, I won't be doing ANY more work for the rest of the year! Woot woot!

Happy New Year!

Julia

P.S. your pictures are awesome. I'm especially impressed with the underwater ones - I want a lesson from you someday.

Julia McCarthy (on detail)
Life/Environmental Scientist
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Wetlands Division
Washington, DC
(202) 566-1660
mccarthy.julia@epa.gov

Success is like wrestling a gorilla. You don't quit when you're tired. You quit when the gorilla is tired. ~Robert Strauss  - Spruce FD 122810 draft_jmm.doc

ATTACHMENT REDACTED - DELIBERATIVE

Jim
Pendergast/DC/USEPA/US
12/29/2010 10:55 AM

To Denise Keehner, Tom Wall
cc David Evans
bcc
Subject Fw: Draft Spruce PR

(b) (5)

----- Forwarded by Jim Pendergast/DC/USEPA/US on 12/29/2010 10:53 AM -----

From: Christopher Hunter/DC/USEPA/US
To: Palmer Hough/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
Date: 12/29/2010 10:40 AM
Subject: Fw: Draft Spruce PR

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/29/2010 10:40 AM -----

From: Gregory Peck/DC/USEPA/US
To:
Cc: Adora Andy/DC/USEPA/US@EPA, Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, (b)(6) Kevin Minoli, Matthew Klasen/DC/USEPA/US@EPA, stoner.nancy@epa.gov
Date: 12/29/2010 09:27 AM
Subject: Re: Fw: Draft Spruce PR

Betsaida

Attached is an updated version of the draft Spruce Press Release. Please let us know if you have any questions.

Best,
Greg



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Draft Spruce Release v.2.docx

Gregory Peck

Betsaida: Hope you had (or are having) a great...

12/28/2010 10:02:17 AM

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA
Cc: stoner.nancy@epa.gov, Denise Keehner/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, (b)(6) Kevin Minoli
Date: 12/28/2010 10:02 AM
Subject: Fw: Draft Spruce PR

Betsaida:

Hope you had (or are having) a great Christmas break. Am resending you the draft PR for the Spruce announcement in case you had not seen it. We're also working to prepare talking points, key messages, and Q's and A's which we'll get to you early next week. As we discussed - we're pointing to a Jan. 11 release.

Let us know if you have any questions.

Best,
Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/28/2010 09:56 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov
Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b)(6) Kevin Minoli
Date: 12/19/2010 11:59 AM
Subject: Draft Spruce PR

Attached is an initial cut at a press release for the Spruce veto. Wanted to get you something early to begin chewing on. (b) (5) ACP We'll be working on the remainder of the communications package during the next week, including Q's and A's, key messages, talking points, and outreach to coordinate support. Also working with Arvin and his staff. Shooting for a Dec 30th release.

We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg

[attachment "2010-12-19 Draft Spruce Release v.1.docx" deleted by Gregory Peck/DC/USEPA/US]

Frank Borsuk/R3/USEPA/US
12/29/2010 11:21 AM

To Stefania Shamet, John Forren, Margaret Passmore,
borsuk.frank
cc Matthew Klasen, Christopher Hunter, David Rider, David
Kargbo
bcc
Subject (b) (5)

(b)
(5)

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]



Hamilton_2003.pdf



Peterson et al 2009 selenium.pdf

Hamilton

(b)
(5)



Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
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Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

How Might Selenium Moderate the Toxic Effects of Mercury in Stream Fish of the Western U.S.?

SPENCER A. PETERSON,^{*,†}
NICHOLAS V.C. RALSTON,[†]
DAVID V. PECK,[†] JOHN VAN SICKLE,[†]
J. DAVID ROBERTSON,[§]
VICKIE L. SPATE,[§] AND
J. STEVEN MORRIS[§]

National Health and Environmental Effects Research Laboratory, Western Ecology Division, U.S. Environmental Protection Agency, Corvallis, Oregon 97333, Energy and Environmental Research Center, University of North Dakota, 15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018, and Department of Chemistry and Research Reactor, Room 209A, University of Missouri, Research Park Drive, Columbia, Missouri 65211

Received November 12, 2008. Revised manuscript received March 11, 2009. Accepted March 17, 2009.

The ability of selenium (Se) to moderate mercury (Hg) toxicity is well established in the literature. Mercury exposures that might otherwise produce toxic effects are counteracted by Se, particularly when Se:Hg molar ratios approach or exceed 1. We analyzed whole body Se and Hg concentrations in 468 fish representing 40 species from 137 sites across 12 western U.S. states. The fish samples were evaluated relative to a published wildlife protective Hg threshold ($0.1 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt.), the current tissue based methylmercury (MeHg) water quality criterion (WQC) for the protection of humans ($0.3 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt.) and to presumed protections against Hg toxicity when Se:Hg molar ratios are >1 . A large proportion (56%) of our total fish sample exceeded the wildlife Hg threshold, whereas a smaller, but significant proportion (12%), exceeded the MeHg WQC. However, 97.5% of the total fish sample contained more Se than Hg (molar ratio >1) leaving only 2.5% with Se:Hg ratios <1 . All but one of the fish with Se:Hg <1 , were of the genus *Ptychocheilus* (pikeminnow). Scientific literature on Se counteracting Hg toxicity and our finding that 97.5% of the freshwater fish in our survey have sufficient Se to potentially protect them and their consumers against Hg toxicity suggests that Se in fish tissue (Se:Hg molar ratio) must be considered when assessing the potential toxic effects of Hg.

Introduction

Selenium is an essential nutrient for all life forms that have nervous systems, but Se can be toxic when present at high levels in the environment. There is no physiological requirement for Hg, but it bioaccumulates in the aquatic food chain and fish are the chief exposure route for wildlife and humans. In fish, MeHg constitutes 95–97% of the total Hg in fish filets (1). Therefore, since total Hg is more easily measured in fish

tissue, total Hg measurements are recommended for fish surveys by EPA (2).

At high exposures, Se and Hg can each be individually toxic, but evidence supports the 1971 observation by Parizek et al. (3) that co-occurring Se and Hg antagonistically reduce each other's toxic effects. In 1972, Ganther et al. (4) found that tuna containing an $\sim 1:1$ molar ratio of Se:Hg reduced toxic effects of MeHg. He attributed the reduced toxicity to Se in the tuna. Various hypotheses for the Se protective mechanism have been proposed (5, 6). One of the most comprehensive involves formation of highly stable organic MeHg-selenocysteine (MeHg-SeCys) that forms in the brain and nervous systems of Hg stressed organisms (7). This form and its products are highly stable, thus making the Se biologically unavailable (8, 9). Sequestration (deactivation) of Se by high concentrations of MeHg inhibits normal selenoenzyme antioxidant activities that result in the adverse effects associated with Hg toxicity. However, during Hg stress, redistribution of Se from somatic cells and dietary sources to preferentially supply the brain replaces some of the Se lost to HgSe and MeHg-SeCys formation. This reduces the toxic effects by maintaining selenium-dependent enzymes (selenoenzymes) required for brain function and protein synthesis (10, 11).

Methylmercury is, by biochemical definition, an irreversible inhibitor of selenoenzymes since it transfers from the thiol of cysteine to the selenol of selenocysteine at the enzymes active site (7, 12). Since selenocysteine is a critical component of protein synthesis and must be formed de novo during each cycle of cellular protein synthesis (7, 12) inhibition of its formation critically impairs cell metabolism. Based on rat (7, 13) and mice studies (14), MeHg toxicity appears to occur when molar concentrations of MeHg exceed those of Se and covalent bonding of MeHg to the Se of selenocysteine occurs, thereby irreversibly inhibiting Se-dependent enzymes (7, 13). In adult onset, molar surpluses of Se over Hg (Se:Hg molar ratio >1) tend to protect the brains of Hg-stressed organisms. Fetal and young organisms are at much greater risk of toxicity from Hg exposure because the rapid rate of cell division in these organisms requires a steady supply of Se. Watanabe et al. (14) demonstrated that in utero Se nutritional status affects MeHg neurotoxicity. Additionally, Ralston et al. (7) found that neurofunctional defects (hind leg crossing) can be stabilized, and growth impairments in young rats can be reversed by increasing the amount of Se in their diets, even while maintaining high MeHg exposures.

Peterson et al. (15) showed that total Hg (THg) in fish filets exceed that in whole fresh water fish ($0.185 \mu\text{g THg} \cdot \text{g}^{-1}$ wet wt. in whole fish = $0.3 \mu\text{g THg} \cdot \text{g}^{-1}$ wet wt. in fish filet). If, as Gather (4) suggested, the molar ratio of Se:Hg in fish filet is ~ 1 it follows that the mass of Se in filet might be approximately the same or greater than that of Hg. Harris et al. (16) and Korbass et al. (17), recently determined that various forms of Se complex with MeHg in fish filets, making the 95–97% of MeHg in fish tissue (1) less toxic to the fish and presumably to consumers (4) of the fish than previously thought. Harris et al. (16) indicated that zebrafish larvae are 20 times less sensitive to cystine-bound MeHg [MeHg(Cys)], the predominant form of MeHg found in fish tissue, than they are to MeHgCl, that is commonly used in toxicity tests. This was corroborated when Cabañero et al. (18) discovered that fish tissue maintains the MeHg(Cys) association after passing through an artificial digestion process. The MeHg(Cys) does not dissociate into toxic MeHg forms as previously suspected.

* Corresponding author e-mail: peterson.spencer@epa.gov.

[†] U.S. Environmental Protection Agency.

[§] University of North Dakota.

[§] University of Missouri.

Selenium's effect in counteracting Hg toxicity increases throughout Se's nutritionally relevant range and has been demonstrated in all insect, fish, bird, and mammal species tested to date (13). However, effects remain controversial. A review of adult effects resulting from fetal exposure in MeHg exposed animal models by Newland et al. (6) suggests that diets rich in Se do not uniformly protect against MeHg's effects. The review by Yang et al. (5) points out that "a large number of scientific studies have provided strong evidence of the protective role of Se in preventing the detrimental effect of CH_3Hg^+ ." Ralston et al. (7) found that MeHg toxicity in rats could not be predicted from tissue MeHg content alone, but that toxicity was directly related to the Hg:Se molar ratios in the tissue. Thus, it appears that selenium-dependent protection against Hg-toxicity depends not on Hg concentrations per se, but rather on the total mass ratio of Se to Hg. Ganther (4) first mentioned the Se:Hg molar ratio of 1:1 as protective against Hg toxicity in fish. Luten et al. (19) drew a similar conclusion relative to both freshwater and marine fish.

Since the evidence indicates that Se:Hg molar ratios influence the toxicity of either element and that these ratios are useful in interpretation of toxicity, we developed the fish tissue data in this paper from that perspective. The purpose of this paper is to describe the Se:Hg molar ratios in whole stream fish ($n = 468$) collected from 137 sites across 12 western U.S. states and to relate those ratios to a published wildlife methylmercury (MeHg) consumption threshold ($0.1 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt.) (20). In addition, we comment on these molar ratios relative to the current methylmercury (MeHg) water quality criterion (WQC) for protection of humans ($0.3 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt.) (21) and on potential fish tissue Se toxicity.

Materials and Methods

Procedures for sample site selection, Hg analysis, Hg quality assurance, and quality control (QA/QC), and results of fish tissue Hg analyses were reported previously (15). Each is described briefly as follows.

Probability Sample Design. For Se analysis, we selected 468 freeze-dried samples that previously had been analyzed for Hg (15). All piscivores ($n = 206$) were analyzed, since those fish commonly contain the highest Hg concentrations and are among commonly sought game fish. Presumably they pose the greatest potential risk of Hg toxicity relative to fish reproduction or consumption by other fish. In addition, we analyzed a random sampling ($n = 262$) of the remaining nonpiscivorous fish.

Stream and river sampling sites were drawn from Arizona, California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming, on a probability basis, from the perennial stream network appearing on the 1:100,000-scale digital line graph database of the United States Geological Survey (22–24). At each site, up to nine individual fish (three individuals from up to three different piscivore and nonpiscivore species) could be collected, but not all sites yielded fish.

Sample Collection and Processing for Hg Analyses. We collected fish from streams and rivers according to wadeable and nonwadeable electrofishing protocols (25, 26). Fish were wrapped in aluminum foil, double-bagged in resealable freezer bags, and shipped on ice to the laboratory within 36 h of being caught (25, 26). At the laboratory, they were inspected for condition and stored frozen at -20°C until processing (15).

Freeze-Dried Sample Preparation. A second set of wet homogenate subsamples were freeze-dried for Se analysis at the same time the above samples were prepared. Since Se analysis by Instrumental Neutron Activation Analysis (INAA) requires a very small, but uniformly mixed sample, the freeze-

dried samples were prepared according to a procedure prescribed by the University of Missouri Research Reactor. The full procedure is described in the Supporting Information (Methods -Se Sample Preparation).

Mercury Analysis. All Hg analyses were done on frozen wet homogenate samples by combustion atomic absorption spectrometry (CAAS) using a direct mercury analyzer (Milestone DMA80; Milestone, Monroe, CT or LECO model AMA 254; LECO Corporation, St. Joseph, MI) and EPA Method 7473 (27). Samples were analyzed in triplicate, and reanalyzed if the relative standard deviation (RSD) exceeded $\pm 5\%$. The result for each sample was reported as the mean wet weight Hg concentration. All Hg analyses were performed within time frames that assured against nondegradation and/or changes in the Hg content of fish tissue (28).

Mercury Detection Limit and Quality Assurance. The analytical method detection limit (MDL) was calculated using the method of Taylor (29) as published in 1986 by the U.S. EPA in 40 CFR Part 136, Appendix B, Revision 1.11. The MDL was based on repeated analyses between 2000 and 2004 ($n = 875$) of a low-level standard (NIST 2976 mussel tissue) and expressed as $\mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt. (assuming a water content of 70% for the mussel species used for the standard (30)). The MDL was calculated to be $0.015 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt.

We assessed analytical precision using 376 duplicate analyses of fish tissue homogenate samples within a single sample batch. Precision expressed as relative percent difference of duplicate measurements was 6.4%. We assessed systematic error of our Hg analyses by repeated analyses of two standard reference materials (SRMs) during sample analytical runs: a high-level SRM (DORM-2 dogfish tissue; Institute for National Measurement Standards (INMS), Ottawa, ON, Canada) and a low-level SRM (NIST 2976 mussel tissue; National Institute of Standards & Technology (NIST), Gaithersburg, MD). For the DORM-2 SRM (certified as $4.64 \pm 0.26 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt.), the mean measured value was $4.58 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt. ($n = 1099$, $\text{SD} = 0.33 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt., relative standard deviation [RSD] = $\pm 7.3\%$), indicating a small negative bias (-1.2%). For the low-level NIST 2976 SRM (certified as $0.061 \pm 0.004 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt.), the mean measured value was $0.070 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt. ($n = 876$, $\text{SD} = 0.021 \mu\text{g Hg} \cdot \text{g}^{-1}$ dry wt., $\text{RSD} = \pm 29.8\%$), indicating a positive bias (14.8%) at lower concentrations.

Selenium Analysis. All Se analyses were performed on freeze-dried fish homogenate samples by standard comparator INAA according to the analysis protocol of the University of Missouri Research Reactor (31–33). The procedure is described briefly in Supporting Information Methods: Se Analysis.

Selenium Limit of Quantitation and Quality Assurance. The limit of quantitation (LOQ) for the INAA Se analysis of fish homogenate under this protocol is on the order of 2 ng, which on a 0.025 g sample yields a fractional mass LOQ of $0.08 \mu\text{g} \cdot \text{g}^{-1}$ dry wt. The LOQ is based on 10 times the square root of the integrated baseline over an energy range of 160.2–163.7 keV. In gamma-ray spectroscopy, the standard deviation of the background for the measurement is the square root of the number of counts in the integrated baseline and the LOQ is 10 times one standard deviation of the background (34).

SRM NIST (1577 Bovine Liver; ca. 30 mg per sample) was used as an external quality control standard for the INAA measurements for two reasons. First, INAA Se analyses require small sample masses (30 mg). Thus, the 250 mg DORM-2 masses recommended by both NIST and National Research Council of Canada are incompatible with the INAA method. Second, DORM-2 and bovine liver standards behave identically relative to the INAA method. The certified value for Se in SRM 1577 is $1.1 \pm 0.1 \mu\text{g Se} \cdot \text{g}^{-1}$ dry wt. Analysis of replicate

TABLE 1. Mass and Molar Concentrations of Mercury and Selenium and Surplus Se Concentrations in Various Fish Groups^a

fish group (n) mean total length (mm) (minimum, maximum)	mercury mean concentration (minimum, maximum)		selenium mean concentration (minimum, maximum)		surplus Se concentration (μmol Se/g wet wt.) mean (std. error)
	μg Hg · g ⁻¹ wet wt	μmol Hg · g ⁻¹ wet wt	μg Se · g ⁻¹ wet wt	μmol Se · g ⁻¹ wet wt	
	Non-Piscivores				
suckers (106)327 (190, 480)	0.114 (0.012, 0.468)	0.0006 (0.0001, 0.0023)	0.556 (0.112, 3.196)	0.0070 (0.0014, 0.0405)	0.0065 (0.0008)
trout and salmon (89)264 (198, 480)	0.090 (0.012, 0.662)	0.0005 (0.0001, 0.0033)	0.798 (0.080, 4.150)	0.0101 (0.0010, 0.0526)	0.0096 (0.0010)
whitefish (23)324 (235, 515)	0.088 (0.013, 0.321)	0.0004 (0.0001, 0.0016)	1.082 (0.075, 1.890)	0.0137 (0.0061, 0.1231)	0.0133 (0.0013)
carp (19)356 (180, 630)	0.067 (0.010, 0.231)	0.0003 (<0.0001, 0.0012)	1.2893 (0.453, 5.460)	0.0163 (0.0057, 0.0691)	0.0160 (0.0036))
bullheads (14)193 (165, 220)	0.115 (0.031, 0.413)	0.0006 (0.0002, 0.0021)	0.522 (0.196, 1.079)	0.0066 (0.0025, 0.0137)	0.0060 (0.0011)
other nonpiscivores (11)231 (165, 390)	0.176 (0.083, 0.285)	0.0009 (0.0004, 0.0014)	0.637 (0.274, 1.352)	0.0081 (0.0035, 0.0171)	0.0072 (0.0016)
all non-piscivores (262)296 (165, 630)	0.103 (0.010, 0.662)	0.0005 (0.0000, 0.0033)	0.740 (0.075, 5.460)	0.0094 (0.0010, 0.0691)	0.0089 (0.0006)
Piscivores					
pikeminnows (59)318 (142, 560)	0.368 (0.053, 1.040)	0.0018 (0.0003, 0.0052)	0.320 (0.093, 1.144)	0.0040 (0.0012, 0.0145)	0.0022 (0.0004)
walleye & sauger (50)348 (135, 570)	0.244 (0.026, 0.587)	0.0012 (0.0001, 0.0029)	0.478 (0.243, 1.102)	0.0061 (0.0031, 0.0140)	0.0048 (0.0004)
bass (48)262 (138, 485)	0.186 (0.042, 0.685)	0.0009 (0.0002, 0.0033)	0.570 (0.096, 1.869)	0.0072 (0.0012, 0.0237)	0.0063 (0.0007)
pike (30)353 (122, 640)	0.170 (0.042, 0.397)	0.0008 (0.0002, 0.0020)	0.360 (0.142, 0.638)	0.0046 (0.0024, 0.0081)	0.0037 (0.0004)
large catfish (14)401 (280, 610)	0.148 (0.049, 0.307)	0.0007 (0.0002, 0.0015)	0.657 (0.434, 1.013)	0.0083 (0.0055, 0.0128)	0.0076 (0.0006)
other piscivores (5)385 (265, 600)	0.221 (0.119, 0.3759)	0.0011 (0.0006, 0.0019)	0.607 (0.518, 0.719)	0.0077 (0.0066, 0.0091)	0.0066 (0.0007)
all piscivores (206)325 (122, 640)	0.248 (0.026, 1.040)	0.0012 (0.0001, 0.0052)	0.452 (0.093, 1.869)	0.0057 (0.0012, 0.0237)	0.0045 (0.0002)

^a Surplus Selenium is the Difference in Molar Concentrations of Se and Hg.

SRM samples ($n = 61$) yielded a mean value of $1.08 \mu\text{g Se} \cdot \text{g}^{-1}$ dry wt. (SD = $0.063 \mu\text{g Se} \cdot \text{g}^{-1}$ dry wt., RSD = $\pm 5.8\%$).

Effect of Measurement Precision on Se Exceedance of Hg. We explored the effect of Se and Hg measurement precision estimates, based on standard reference materials, relative to Se molar concentration of individual fish exceeding the Hg molar concentration. After conversion to wet weight molar concentrations, the precision estimates (standard deviations) of measured and certified values for the DORM-2 SRM (for Hg) and of the NIST 1577 SRM (for Se) were equal to $0.00020 \mu\text{mol Hg} \cdot \text{g}^{-1}$ wet wt. and $0.00022 \mu\text{mol Se} \cdot \text{g}^{-1}$ wet wt., respectively.

We assumed that the Se and Hg measurements were unbiased and independent, and modeled the true (but unknown) difference in molar concentration between Se and Hg as a normally distributed random variable, with mean equal to the measured difference, and standard deviation $\sqrt{(0.00020^2 + 0.00022^2)} = 0.00030 \mu\text{mol} \cdot \text{g}^{-1}$ wet wt. With these assumptions, the true mean difference has a $\geq 90\%$ probability of exceeding zero (Se molar concentration > Hg molar concentration) if the measured difference exceeds $1.28 \times 0.00030 = 0.00038 \mu\text{mol} \cdot \text{g}^{-1}$ wet wt., where 1.28 is the 90th percentile of the standard normal distribution. Thus, we considered any fish having a measured difference (Se-Hg) exceeding $0.00038 \mu\text{mol} \cdot \text{g}^{-1}$ wet wt. to have true Se exceeding true Hg, i.e., $\text{Se:Hg} > 1$. However, we did not adjust concentration statistics of Se, Hg, their difference, or their ratio for measurement precision.

Results and Discussion

Fish Samples. Selenium analyses were performed on 468 fish of 40 different species from 137 sites (some with multiple fish samples) across 12 western U.S. states (Figure 1). Fish included all of the piscivores ($n = 206$) analyzed previously for Hg by Peterson et al. (15) and a random sampling of the remaining nonpiscivores ($n = 262$) from that original sampling of 2707 large fish. As expected, the mean Hg concentration for all piscivores in Table 1 (**Bold Summary**) is greater (more than double) than the mean for all nonpiscivores. The mean Se concentration is greater for all piscivores than for all nonpiscivores. Mean Hg concentrations ($\mu\text{g} \cdot \text{g}^{-1}$ wet wt.) by fish group in Table 1 indicate all of the piscivore groups pose a toxicity risk relative to the wildlife threshold of $0.1 \mu\text{g Hg} \cdot \text{g}^{-1}$ wet wt., but the nonpiscivore groups present a mixed picture. Several individual pike-minnow, walleye, sauger, bass, and pike exceed the MeHg WQC ($0.3 \mu\text{g} \cdot \text{g}^{-1}$ wet wt. for file) as it relates to whole fish Hg concentrations ($\geq 0.185 \mu\text{g} \cdot \text{g}^{-1}$) (15). Based on an assessment using the MeHg WQC many individual fish in our sample likely would be recommended for limited or non-consumption by either wildlife or humans.

Selenium: Mercury Molar Ratios. Based on Se soil concentrations across our study area ranging from 0.17 to $0.74 \mu\text{g} \cdot \text{g}^{-1}$ dry wt (35), we expected to see many fish types and regions in the western U.S. with fish Se:Hg molar ratios <1. However, there is a general geographic pattern of Se:Hg molar ratios >1 (surplus Se), but surplus Se is not uniformly present in all fish (Figure 2 and Supporting Information Table S1).

Figure 2 suggests that Se:Hg molar ratios might decline with increasing fish size, possibly reducing Se protection in larger fish. We tested this by linear regression of surplus Se against total fish length for piscivores and nonpiscivores. The relationship for piscivores is poor ($r^2 = 0.085$) and the one for nonpiscivores is worse ($r^2 = 0.0004$). We conclude from this that Se protection against Hg toxicity in larger fish probably remains intact. The proportion of piscivores with $\text{Se:Hg} < 1$ (11 of 206) was substantially greater than that of nonpiscivores (1 of 262 fish; $P < 0.001$, for Fisher's exact test of the difference between proportions).

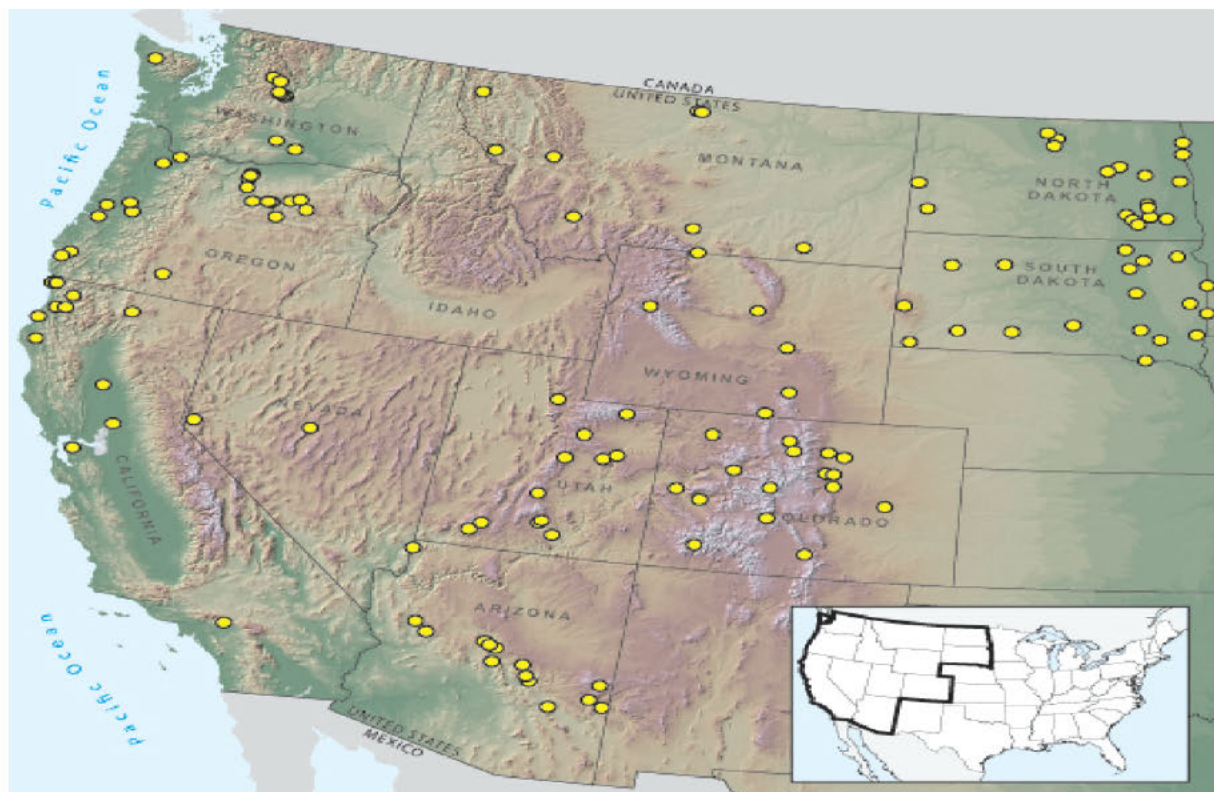


FIGURE 1. Location of probability based sites where fish tissue samples were collected for Hg and Se analysis.

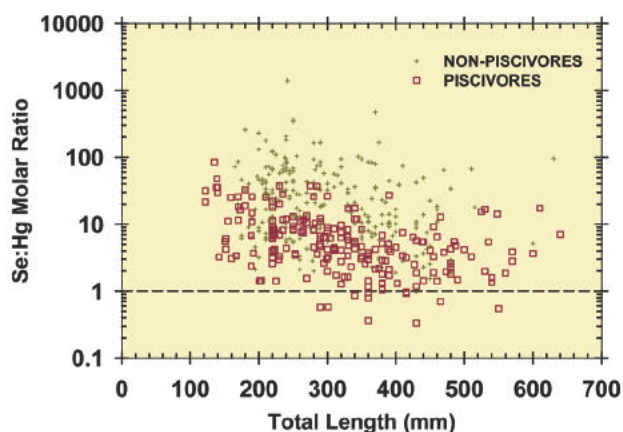


FIGURE 2. Molar ratio of selenium to mercury relative to fish size. The horizontal dotted line is the Se:Hg, 1:1 line.

Pikeminnows. All of the fish in Figure 2 that have a Se:Hg molar ratio <1 were pikeminnows (*Ptychocheilus spp.*), except the one largescale sucker (*Catostomus macrocheilus*), ranging in total length from about 300 to about 550 mm. There were 23 smaller and one larger pikeminnows with a Se:Hg molar ratio >1 . This suggests that some combination of fish species, fish size and possibly environment might play a role in determining Se:Hg ratios. Northern pikeminnows represent the top of the freshwater aquatic food chain and are known to be voracious piscivores (36). Zimmerman (36) found that the stomach of pikeminnows, relative to their total weight (index of feeding (IF)) was more than twice that of smallmouth bass (*Micropterus dolomieu*). This perhaps increases Hg bioaccumulation in large pikeminnows over other piscivores due to the potential uptake from the large stomach mass. However, since pikeminnow size alone appears not to control Se:Hg molar ratios, other factors must contribute. Pikeminnows having a molar ratio of Se:Hg <1 came from seven sites: five in Oregon, one in Montana, and one in Washington.

This suggests that local or regional environmental factors such as, wetland extent (37), forested regions (38), agricultural areas (39), and/or several water quality variables including pH, alkalinity, DOC, and SO_4 (40–43) might contribute to a molar surplus of Hg relative to Se. Zimmerman (36) suggested that some combination of these factors do influence the chemical burdens of fish with his finding that northern pikeminnow had significantly higher IF values in the Snake River than in the Columbia River and that stomach fullness, while significantly greater in summer than in spring in the unimpounded lower Columbia River, did not differ between seasons in the impounded reaches of the Columbia and Snake Rivers.

Mercury vs Selenium. High Hg concentrations in fish tissue from our samples were found only when Se concentrations in the same tissue were low (Figure 3). This is consistent with Belzile et al. (44) who found reduced bioaccumulation of Hg in all lake trophic levels (including young-of-the-year fish) downwind from the Sudbury, Ontario smelters. They concluded "Selenium plays an important role in limiting the whole-body assimilation of Hg at lower levels of the aquatic food chain." Bioaccumulation differs from, but is not entirely unrelated to, Hg toxicity potential. Concentration gradients in our study are not as well-defined geographically as those at Sudbury, but our results do suggest that fish species and environmental variability influence Se:Hg molar ratios in freshwater fish.

Mercury Criteria vs Se:Hg Molar Ratios. Peterson et al. (15) estimated the proportion of stream length across the western U.S. where the total Hg in fish tissue exceeded the wildlife threshold (20) and the current MeHg WQC (21). Those estimates are accurate relative to the wildlife and human health benchmarks for Hg alone, however, they likely exaggerate Hg toxicity potentials relative to an assessment based on Se:Hg molar ratios.

Considering all fish in our sample ($n = 468$), 56% exceeded the wildlife Hg threshold ($0.1 \mu\text{g Hg g}^{-1}$ wet wt.) (20) and 12% exceeded the MeHg WQC ($0.3 \mu\text{g Hg g}^{-1}$ wet wt.) (21). When

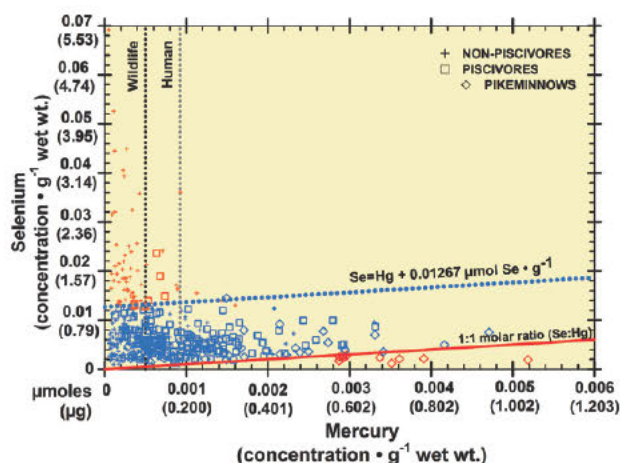


FIGURE 3. Selenium and mercury concentrations in whole fish tissue. The vertical dotted, line closest to the y-axis represents the $0.1 \mu\text{g Hg}\cdot\text{g}^{-1}$ wet wt. whole fish wildlife threshold (20). The vertical dotted line to the right is drawn at $0.185 \mu\text{g Hg}\cdot\text{g}^{-1}$ wet wt. whole fish (equals $0.3 \mu\text{g Hg}\cdot\text{g}^{-1}$ wet wt. of filet), which represents the human health filet tissue based water quality criterion (27). The angled red line near the bottom of the figure is the Se:Hg, 1:1 line. The dotted blue line above and parallel to the 1:1 line is drawn at $4 \mu\text{g Se}\cdot\text{g}^{-1}$ dry wt. = $1.0 \mu\text{g Se}\cdot\text{g}^{-1}$ (wet wt.) = $0.01267 \mu\text{mol Se}\cdot\text{g}^{-1}$ wet wt. above the 1:1 line and represents the surplus Se level (or toxic effect threshold (TET)) where fish exhibit reproductive failure (49). Fish shown in red below the Se:Hg, 1:1 line have a surplus of Hg. Fish shown in blue, between the red dashed 1:1 line and the blue dotted Se TET-line, presumably are protected from Hg toxicity by surplus Se. Fish shown in orange, above the blue dotted line, have surplus Se above the Se TET, and their consumers might risk Se toxic effects.

examined by major feeding groups, 33% of the nonpiscivores ($n = 262$) and 84% of the piscivores ($n = 206$), respectively, exceeded the wildlife Hg threshold. Five percent of the nonpiscivores and 25% of the piscivores exceeded the MeHg WQC. Based on Hg concentrations alone, a large proportion of the fish in our sample would exceed the MeHg WQC and possibly be unfit for consumption. However, if we consider that a molar ratio surplus of Se:Hg >1 in fish might be sufficient to prevent Hg toxicity in the fish and consumers of the fish (4), only 12 samples (those below the 1:1 line in Figure 3) would be considered unsuitable for wildlife consumption. By allowing for Se and Hg measurement uncertainty and applying that to the 1:1 line in Figure 3, only one more fish with a Hg molar surplus was added to the group. Thus, based on their Se:Hg molar ratios, 13 fish (2.7% of our total sample) might pose Hg toxicity problems for wildlife consumers. However, if we assess the potential toxicity of the 13 fish with Hg surplus (Hg $>$ Se) based on the current MeHg WQC of $0.3 \mu\text{g Hg}\cdot\text{g}^{-1}$ wet wt., only 6 of the 13 fish have that amount or more Hg $>$ their 1:1 Se:Hg molar ratio. Thus, potential Hg toxicity in our entire fish sample might be no more than seven (1.3% of our sample). Since all of these fish are northern pikeminnows, this could be important to northwestern Native Americans because they commonly consume northern pikeminnows. Here we have compared the Hg surplus, relative to the Se:Hg ratio in whole fish to a human consumption criterion. We realize that such a comparison might not be directly pertinent to those human consumers of western U.S. fish who eat only the filet tissue. This discrepancy emphasizes the need to know the Se:Hg ratios in fish filet as well as in whole fish tissue.

The Se:Hg molar ratios in freshwater fish tissue have not been reported extensively. However, it has become more common for marine species. Kaneko and Ralston (45) reported Se:Hg >1 in filet of all marine fish except mako

shark. Luten et al. (19) reported similar results for marine fish filets. However, all of their freshwater fish species (pike, perch and pike-perch; $n = 21$) exhibited Se:Hg molar ratios of <1 . This is in near total contrast to our results, which is not surprising, since theirs was a European study and the soils of north-central Europe and the Scandinavian countries are depauperate of Se (46). This likely contributes to the high Hg levels relative to the low Se levels observed in their freshwater fish (47). Kehrig et al. (48) measured Se and Hg in hepatic and muscle tissue of four fish species in a tropical estuary. They found the Se:Hg molar ratios were >1 (5 to 70 times $>$) in both tissue types of all fish. Because reports of Se:Hg ratios in freshwater fish are rare and because geographic regions differ, more documentation is needed. This is particularly true for regions of the eastern U.S. and for lakes and reservoirs that might produce Se:Hg fish tissue ratios considerably different from the ones we report here for stream fish of the western U.S.

Potential Se Toxicity. Small amounts of Se are required by all cells of virtually all forms of animal life, but Se levels above certain threshold limits can be harmful. Lemly's (49) whole body $4.0 \mu\text{g Se}\cdot\text{g}^{-1}$ dry wt. ($1.0 \mu\text{g}\cdot\text{g}^{-1}$ wet wt., or $0.01267 \mu\text{mol}\cdot\text{g}^{-1}$ wet wt.) toxic effect threshold (TET) is the concentration at which fish experience reproductive failure and juvenile mortality. This TET is widely cited in the literature. Thus, we used this benchmark to assess Se toxicity potential in our fish sample. There are 456 fish in Figure 3 that have a Se:Hg molar ratio >1 . Presumably, all of these fish are protected against Hg toxicity. However, there are 68, or 15% of the 456 fish that have Se concentrations that exceed the Lemly (49) TET of $1.0 \mu\text{g Se}\cdot\text{g}^{-1}$ wet wt. above the 1:1 line. This raises potential selenium toxicity (selenosis) concerns for those fish and their consumers. Thus, in our sample there are ~ 6 times more fish in the potential Se toxicity category than those in the potential Hg toxicity category.

Our finding that nearly all (97.5%) of the freshwater fish in our survey have sufficient Se to potentially protect them and their consumers against Hg toxicity suggests that consideration of Se–Hg interactions might improve our understanding of risks associated with fish tissue Hg toxicity. Several researchers (13, 19, 45, 50) recommend measuring Se concurrently with Hg in fish tissue and considering the Se–Hg interaction. The focus of future research should be on the Se protective mechanism itself, on the effects of co-occurring Se and Hg, and on establishing the Se:Hg molar ratios of whole fish vs filets in streams, lakes and reservoirs in various geographic settings.

Acknowledgments

The information in this document has been funded wholly (or in part) by the U.S. Environmental Protection Agency as part of the Environmental Monitoring and Assessment Program (EMAP). It has been subjected to technical and policy review by the National Health and Environmental Effects Research Laboratory's Western Ecology Division and approved for publication. Approval does not signify that the contents reflect the views of the Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. N.V.C.R. was supported by the U.S. Environmental Protection Agency through grant CR830929-01 to the University of North Dakota Energy and Environmental Research Center. We thank the EMAP field crews who collected fish from the 12 western states. GIS support for the sampling design was provided under Contract 68-W01-032 to Computer Sciences Corporation. Support for fish tissue sample preparation at WED-Corvallis was provided through Contracts 68-D06-005 and EP-D-06-013 to Dynamac, Inc. Jason Schacher and Rick King (Dynamac, Inc.) performed the Hg analyses. All Se analyses were performed at the University of Missouri-Columbia Research Reactor Center

under Contract EPO7R000069. In addition to the above persons and entities, we thank Dennis Lemly, Dixon Landers, Bob Ozretich, Anne Fairbrother, Jeff Bigler, Rita Schoeny, Kate Mahaffey, Edward Ohanian, Charles Delos, and three anonymous reviewers who provided valuable comments on an earlier draft.

Supporting Information Available

Table S1 lists all fish groups analyzed, their mercury and selenium concentrations and the selenium surpluses for each group. Additionally, details of the fish tissue sample preparation method and the selenium neutron activation analysis are described. This material is available free of charge via the Internet at <http://pubs.acs.org>.

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Ecotoxicology and Environmental Safety 56 (2003) 201–210

Ecotoxicology
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Commentary

Review of residue-based selenium toxicity thresholds for freshwater fish

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Received 28 March 2002; received in revised form 10 July 2002; accepted 15 July 2002

Abstract

A variety of guidelines have been proposed in recent years for linking selenium concentrations in the whole body of fish or in diet with adverse effects in fish. Diverging viewpoints seem to be forming separating groups supporting either the low selenium guidelines proposed by the government and academic researchers or the high selenium guidelines proposed by other researchers. Recently, an article was published that reviewed selected studies and recommended guidelines for selenium concentrations in the whole body of fish and in diet that were higher than those proposed by other researchers ($\approx 4 \mu\text{g/g}$ in whole body and $3-4 \mu\text{g/g}$ in diet). That article also recommended separating guidelines for coldwater fish ($6 \mu\text{g/g}$ in whole body and $11 \mu\text{g/g}$ in diet) and warmwater fish ($9 \mu\text{g/g}$ in whole body and $10 \mu\text{g/g}$ in diet). The approaches, information, and guidelines presented in the article are reviewed and problems in their interpretation and conclusions are discussed. The majority of the selenium literature supports a whole body threshold of $4 \mu\text{g/g}$ in fish and $3 \mu\text{g/g}$ in diet.

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Keywords: Selenium; Diet; Fish; Threshold; Tissue based criteria

1. Introduction

The criteria for selenium in the aquatic ecosystem has become a controversial topic in recent years as evidenced by debate articles in the journal *Human and Ecological Risk Assessment* (Chapman, 1999; Lemly, 1999a; Hamilton, 1999; Ohlendorf, 1999; DeForest et al., 1999; Fairbrother et al., 1999), response articles (Skorupa, 1999; Fairbrother et al., 2000), and debates at national scientific meetings, i.e., “Selenium in the Environment: A Ticking Time Bomb or No Big Deal?” (SETAC, 1999). There seems to be a divergence between academia or government-backed articles proposing low-selenium criteria (SWRCBC, 1987; UCC, 1988; DuBow, 1989; Skorupa and Ohlendorf, 1991; Pease et al., 1992; Peterson and Nebeker, 1992; Lemly, 1993a, 1996; Maier and Knight, 1994; Engberg, 1999; Skorupa, 1998; USDO, 1998) and nongovernmental articles proposing high criteria (Canton and Van Derveer, 1997; Van Derveer and Canton, 1997; Canton, 1999;

DeForest et al., 1999; Adams et al., 2000; Brix et al., 2000).

The US Environmental Protection Agency (USEPA) is currently in the process of revising the selenium chronic criterion for the protection of aquatic life (C. Delos and K. Sappington, USEPA, written communications), which was established in 1987 (USEPA, 1987). One step in the USEPA revision process was a peer consultation workshop on the bioaccumulation and aquatic toxicology of selenium, held to discuss the technical issues underlying the freshwater aquatic life chronic criterion (USEPA, 1998). The nine-member peer review group was composed of representatives from federal agencies, academia, private consultants, and industry. The subjects of interest in the workshop included the potential development of a water-based criterion, a tissue-based criterion, and a sediment-based criterion. The general consensus of the peer review group was that the relationship between water-borne and sediment selenium concentrations to the tissue accumulation of selenium was poor because of the importance of dietary exposure in determining the potential for chronic effects. Consequently, there has been recent interest in promoting a tissue-based criterion

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or threshold (DeForest et al., 1999; Brix et al., 2000; Hamilton, 2002).

2. Critique of a tissue-based selenium threshold paper

A recent article by DeForest et al. (1999) reviewed the proposed residue-based toxicity thresholds for freshwater fish. Similar information was given in Brix et al. (2000). They proposed whole-body thresholds of 9 µg/g (all given as dry weight) for warmwater fish and 6 µg/g for larval coldwater anadromous fish, ovary threshold of 17 µg/g for warmwater fish, and fish dietary thresholds of 10 µg/g for warmwater fish and 11 µg/g for larval coldwater anadromous fish. These values are substantially different from those proposed by Maier and Knight (1994; 4.5 µg/g in tissue and 4 µg/g in diet), Lemly (1993a, 1996; 4 µg/g in whole body, 10 µg/g in ovary, and 3 µg/g in diet), and Hamilton (2002; 4 µg/g in tissue).

The DeForest et al. (1999) article seems to have fallen short of their objective of critically reviewing the proposed tissue-based thresholds for freshwater fish because they excluded the results of water-borne studies and selectively discussed results from dietary studies. Their review focused primarily on Lemly (1993a) and they correctly cite several errors in two summary tables. Those errors were corrected in Lemly (1996), which they do not cite. They also did not include information from the review article on selenium toxicology by Maier and Knight (1994) in their review. Maier and Knight (1994) independently proposed threshold concentrations for selenium effects that were similar to those of Lemly (1993a, 1996).

2.1. Errors in Lemly (1993a)

Despite the errors in Lemly (1993a), the proposed tissue-based thresholds were still supported unchanged in Lemly (1996). The residue-based thresholds proposed by DeForest et al. (1999) seem overly high and are not supported by the majority of the selenium literature. The review by DeForest et al. (1999) seems to be incomplete and does not include important articles that further supported the thresholds proposed by Lemly (1996).

Numerous authors cite Lemly (1993a) as the first comprehensive review of the selenium literature and proposal of selenium residue-based thresholds. Few authors cite Lemly (1996), which has conclusions similar to those of Lemly (1993a), but different supporting data in Tables 1 and 2, which had similar supporting citations between the two publications. No one in their publications has noted the difference in values given in Tables 1 and 2 in those two publications (Tables 1 and 2).

2.2. Additional articles supporting Lemly's proposed values

Several articles not cited in Lemly (1993a, 1996) or published later support the 4 µg/g whole-body concentration for toxic effects in fish (Hilton and Hodson, 1983; Cleveland et al., 1993; Lemly, 1993b; Hamilton et al., 1996, 2001a, b) (Table 3). This effect concentration in the whole body was supported by Skorupa et al. (1996), who proposed 4–6 µg/g, and Maier and Knight (1994) who proposed 4.5 µg/g.

Likewise, several articles not cited in Lemly (1993a, 1996) or published later support the 3-µg/g dietary toxicity threshold for fish (Cleveland et al., 1993; Lemly, 1993b; Hamilton et al., 1996, 2001a, b) (Table 4). These articles report effect concentrations of 4.6–6.5 µg/g, which suggests a threshold concentration at a lower concentration, i.e., conservatively <4.6 µg/g. Those articles lend further support to the 3 µg/g threshold of effects suggested by Hilton et al. (1980), Lemly (1993a, 1996) and Skorupa et al. (1996) and the 4 µg/g threshold suggested by Maier and Knight (1994).

2.3. Information not cited in DeForest et al.

DeForest et al. (1999) cited selenium contamination problems at Belews Lake, North Carolina, Hyco Reservoir, North Carolina, and Kesterson Reservoir, California, but did not cite selenium contaminant problems at Sweitzer Lake, Colorado (Barnhart, 1957; Birkner, 1978; Butler et al., 1989, 1991, 1994, 1996) or Martin Lake, Texas (Sorensen, 1991).

Similarly, DeForest et al. (1999) cited Van Derveer and Canton (1997) as demonstrating that fish in lotic systems in Colorado were not at risk at water selenium concentrations of approximately 30 µg/L. However, they failed to mention that the articles by Canton and Van Derveer (1997) and Van Derveer and Canton (1997) had incorrectly interpreted exposure survey reports as being exposure-response studies, ignored the importance of the water-borne entry of selenium in aquatic food webs, overlooked key studies from the extensive body of selenium literature, and failed to consider the offstream consequences of proposing high instream selenium standards (Hamilton and Lemly, 1999). Offstream concerns of selenium contamination have also been discussed in Skorupa (1998) and Lemly (1999b). These offstream concerns about selenium contamination were substantiated by Radtke et al. (1988) and Radtke and Kepner (1990), who concluded that elevated selenium concentrations in sediment and biota in the backwaters of the lower Colorado River were carried by water from the upper Colorado River basin and not derived from local agricultural or industrial sources.

DeForest et al. (1999) chose to disregard the results of the SLD diet despite the more realistic exposure scenario

Table 1
Selenium concentrations in tissue associated with toxic effects in fish and aquatic organisms

Species ^a	Tissue	Lemly (1993a) selenium concentration ($\mu\text{g/g}$) ^b	Lemly (1996) selenium concentration ($\mu\text{g/g}$) ^b	Effect	Reference
Rainbow trout	Whole body	3	2	Blood changes	Hodson et al. (1980)
	Liver	12	51	Blood changes	Hodson et al. (1980)
	Whole body	5	5	Mortality	Hilton et al. (1980)
	Whole body	4	1	Mortality	Hunn et al. (1987)
Chinook salmon	Whole body	9.5	20	Reduced smolting	Hamilton et al. (1986)
	Whole body	3	2	Reduced growth	Hamilton et al. (1990)
	Whole body	10	5	Mortality	Hamilton et al. (1990)
Fathead minnow	Whole body	6	5	Reduced growth	Ogle and Knight (1989)
	Ovaries	15	24	Reproductive failure	Schultz and Hermanutz (1990)
	Whole body	8	16	Reproductive failure	Schultz and Hermanutz (1990)
Striped bass	Skeletal muscle	14	14	Mortality	Coughlan and Velte (1989)
	Whole body	NG ^c	2	Mortality	Saiki et al. (1992)
Bluegill	Skeletal muscle	20	20	Mortality	Finley (1985)
	Liver	32	34	Mortality	Finley (1985)
	Carcass	8	24	Reproductive failure	Gillespie and Baumann (1986)
	Ovaries	12	23	Reproductive failure	Gillespie and Baumann (1986)
	Whole body	5	5	Mortality	USFWS (1990)
	Whole body	16	19	Reproductive failure	Coyle et al. (1993)
	Ovaries	30	34	Reproductive failure	Coyle et al. (1993)
	Eggs	40	42	Reproductive failure	Coyle et al. (1993)
	Ovaries	10	18	Reproductive failure	Hermanutz et al. (1992)
	Skeletal muscle	10	16	Reproductive failure	Hermanutz et al. (1992)
	Liver	22	29	Reproductive failure	Hermanutz et al. (1992)
	Whole body	12	18	Reproductive failure	Hermanutz et al. (1992)
	Whole body	15	15	Teratogenic defects	Lemly (1993c)
Green alga	Whole organism	20	20	Reduced cell replication	Foe and Knight (1986)
Cyanobacterium	Whole organism	700	394	Reduced chlorophyll a	Kiffney and Knight (1990)
Cladoceran	Whole organism	20	15	Reduced weight	Ingersoll et al. (1990)
	Whole organism	30	32	Reproductive failure	Ingersoll et al. (1990)
Aquatic birds	Liver	10	NG	Reproductive failure	Skorupa et al. (in press)
	Eggs	3	NG	Reproductive failure	Skorupa et al. (in press)

^aRainbow trout (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), fathead minnow (*Pimephales promelas*), striped bass (*Morone saxatilis*), bluegill (*Lepomis macrochirus*), green alga (*Selenastrum capricornutum*), cyanobacterium (*Anabaena flosaquae*), cladoceran (*Daphnia magna*).

^bSelenium concentrations on a dry weight basis.

^cNot given in Lemly (1993a).

compared to the selenomethionine- (SEM) based diet in the studies with chinook salmon (*Oncorhynchus tshawytscha*) (Hamilton et al., 1990). Although there were differences in the diet formulation between the SLD-based diet and the SEM-based diet, reduced survival occurred in both dietary selenium exposures at 9.6 $\mu\text{g/g}$, and the whole-body selenium residues were remarkably similar (6.5 $\mu\text{g/g}$ in the SLD diet and 5.4 $\mu\text{g/g}$ in the SEM diet). Other adverse effects from the two diets were also similar between the two diets. The slight reduction in

growth that occurred earlier and at slightly lower dietary concentrations in the SLD diets compared to the SEM diets was a minor discussion point in Hamilton et al. (1990).

DeForest et al. (1999) cited Brown (1997) to imply that pesticide residues in western mosquitofish (*Gambusia affinis*) used in the San Luis Drain (SLD) diet tested in Hamilton et al. (1990) may have influenced the results of dietary exposures with chinook salmon. The possibility of confounding effects from pesticides or other

Table 2
Concentrations of selenium known to be toxic in the diets of fish and wildlife

Species	Lemly (1993a) dietary selenium concentration (µg/g) ^a	Lemly (1996) dietary selenium concentration (µg/g) ^a	Effect	Reference
Rainbow trout	9	9	Mortality	Goettl and Davies (1978)
	> 3	13	Mortality	Hilton et al. (1980)
	10	11	Kidney damage	Hilton and Hodson (1983)
Chinook salmon	6.5	6.5	Mortality	Hamilton et al. (1989)
	5	5	Reduced growth	Hamilton et al. (1990)
Fathead minnow	20	20	Reduced growth	Ogle and Knight (1989)
Striped bass	35	39	Mortality	Coughlan and Velte (1989)
Bluegill	50	54	Mortality	Finley (1985)
	6.5	6.5	Mortality	USFWS (1990)
	NG ^b	5	Mortality	Lemly (1993b)
	13	13	Reproductive failure	Woock et al. (1987)
	16	33 ^c	Reproductive failure	Coyle et al. (1993)
Mallard duck ^d	> 4	11	Reproductive failure	Heinz et al. (1987)
	> 4	9	Reproductive failure	Heinz et al. (1989)

^a Selenium concentrations on a dry weight basis.

^b Not given in Lemly (1993a).

^c Exposure included 10 µg/L in water.

^d Mallard duck (*Anas platyrhynchos*).

Table 3
Selenium concentrations in tissue associated with toxic effects in fish

Exposure route, species	Tissue	Selenium concentration (µg/g)	Effect	Reference
<i>Diet</i>				
Rainbow trout	Carcass	4.0 4.5	Kidney damage and reduced weight	Hilton and Hodson (1983)
Fathead minnow	Whole body	43 61	Reduced growth	Bennett et al. (1986)
Bluegill	Whole body	25	Mortality	Bryson et al. (1984)
	Whole body	4.3 ^a	Mortality	Cleveland et al. (1993)
	Whole body	7.9	Mortality	Lemly (1993b)
Channel catfish	Muscle	3.5	Reduced growth	Gatlin and Wilson (1984)
Razorback sucker	Whole body	3.6 8.7	Mortality	Hamilton et al. (1996)
	Whole body	5.4	Mortality	Hamilton et al. (2001a)
	Whole body	6.1	Mortality	Hamilton et al. (2001b)
<i>Water</i>				
Bluegill	Whole body	5.1 ^b	Mortality	Cleveland et al. (1993)
Razorback sucker	Whole body	5.9	Reduced growth	Hamilton et al. (2000)
Bonytail	Whole body	9.4	Reduced growth	Hamilton et al. (2000)

^a Derived from Fig. 3 in Cleveland et al. (1993).

^b Derived from Fig. 2 in Cleveland et al. (1993).

contaminants in Kesterson studies has been explored, but none have been reported (i.e., Moore et al., 1990; Ohlendorf et al., 1993). Nevertheless, the toxicity of water from the SLD to fish has been reported and linked to high concentrations of major ions present in atypical ratios, to high concentrations of sulfates, or to both (Saiki et al., 1992).

In fact, in several other selenium contaminant studies, concerns about the influence of other interacting chemicals have been expressed, but none confirmed. For example, Sorensen (1986) stated that “Fish kills [at Belews Lake, NC, and Martin Lake, TX] were considered a direct result of selenium release into the main basin of the lakes because several hundred

Table 4
Selenium concentrations known to be toxic in the diets of fish

Species	Dietary selenium concentration ($\mu\text{g/g}$)	Effect	Reference
Fathead minnow	55 70 ^a	Reduced growth	Bennett et al. (1986)
Bluegill	45 ^b	Mortality	Bryson et al. (1984)
	6.5 ^c	Mortality	Cleveland et al. (1993)
	5.1 ^d	Mortality	Lemly (1993b)
Razorback sucker	2.4 5.1 ^e	Mortality	Hamilton et al. (1996)
	4.6 ^f	Mortality	Hamilton et al. (2001a)
	4.6 ^f	Mortality	Hamilton et al. (2001b)

^a Rotifers fed selenium laden algae.

^b Burrowing mayfly nymphs (*Hexagenia limbata*) collected from Belews Lake, North Carolina.

^c Selenomethionine incorporated into an Oregon moist pellet diet.

^d Exposure included water borne exposure to 4.8 $\mu\text{g/L}$ selenium and winter stress (4c).

^e Zooplankton collected from Sheppard Bottom ponds 1, 3, and 4 at Ouray NWR, Utah.

^f Zooplankton collected from three sites near Grand Junction, Colorado.

analyses for metals, metalloids, physiochemical parameters, and pesticides provided essentially negative results except for sufficiently high levels of selenium in the water (about 5 $\mu\text{g/L}$) to warrant concern.” Others have reached similar conclusions concerning fishery problems at Belews Lake (Lemly, 1985), water and biota collected from Kesterson Reservoir area, California (Saiki and Lowe, 1987), trace elements in fish from the Merced River, and from Salt Slough, San Joaquin Valley, California (Nakamoto and Hassler, 1992), studies of Hyco Reservoir, North Carolina (Bryson et al., 1984; Gillespie and Baumann, 1986), and phosphate-mining activities in the Blackfoot River watershed of southeastern Idaho (Watson, 1998).

2.4. Water-borne versus dietary exposure

DeForest et al. (1999) did not include results from water-borne studies, but rather limited their analyses to dietary studies. In doing so, they eliminated several studies that relate directly to the tissue threshold of 4 $\mu\text{g/g}$ suggested by Lemly (1993a, 1996), 4.5 $\mu\text{g/g}$ of Maier and Knight (1994), and 4 $\mu\text{g/g}$ of Hamilton (2002). For example, they discard the results of Hunn et al. (1987), who reported adverse effects in rainbow trout (*Oncorhynchus mykiss*), with 5.2 $\mu\text{g/g}$ (assuming 75% moisture) in the whole body because it was a water-borne exposure.

Critically reviewing a residue-based toxicity threshold should include consideration of the results of water-borne studies. A selenium residue in a fish is the result of all exposures, dietary, water-borne, and sedimentary. The exposure routes are concurrent and inseparable. For example, four studies with young fall chinook salmon used different test waters and exposure routes, but had remarkably similar results based on whole-body

selenium residues (Hamilton et al., 1986, 1990; Hamilton and Wiedmeyer, 1990). In separate dietary studies, fish were exposed to either SEM in a commercially prepared diet or to the same diet made with fish meal containing elevated concentrations of naturally incorporated seleno-compounds, and reduced growth occurred in fish with whole-body residues of 4.0–5.4 $\mu\text{g/g}$ (Hamilton et al., 1990). In separate water-borne studies, fall chinook salmon were exposed to water-borne selenium in two different water qualities and adverse effects (reduced growth and survival) occurred in fish with whole-body residues of 3.8–4.9 $\mu\text{g/g}$ (Hamilton et al., 1986; Hamilton and Wiedmeyer, 1990). Even though the routes of exposure were different in these studies, a common whole-body selenium residue of 4–5 $\mu\text{g/g}$ was associated with the same adverse effects.

The convergence of adverse effects from water-borne and dietary exposures with a variety of fish suggests that once tissue selenium concentrations reach a critical threshold, regardless of the route of exposure, adverse effects will occur. This supposition is supported by results from several studies, including Hodson et al. (1980), where rainbow trout were exposed to 53 $\mu\text{g/L}$ of selenium for 308 days, but no effects were observed on the survival, growth, condition factor, or several blood and plasma measurements because whole-body selenium residues were only 1.8 $\mu\text{g/g}$. Hamilton and Wiedmeyer (1990) found no effects on mortality or growth of 2-g fall chinook salmon exposed to water-borne selenium concentrations as high as 140 $\mu\text{g/L}$ for 60 days in a blended brackish water (~1‰ salinity) because whole-body selenium residues were only 1.3 $\mu\text{g/g}$. Bertram and Brooks (1986) reported no effects on fathead minnow (*Pimephales promelas*) exposed to 7.3 $\mu\text{g/g}$ in the diet and 43.5 $\mu\text{g/L}$ in water for 56 days because whole-body

residues were only 2.2 µg/g. These water-borne and combined diet and water-borne exposure studies help define the upper end of the no-effect tissue threshold (1.3–2.2 µg/g) and the lower end of the effect tissue threshold (3.8–4.0 µg/g). Consequently, a threshold tissue concentration of 4 µg/g would seem reasonable.

DeForest et al. (1999) discussed their supposition that water-borne exposures result in mortality at lower whole-body selenium concentration than dietary exposures, and used Cleveland et al. (1993) as their focal point. The authors did not mention that the water-borne study was conducted with 5-month-old fish and the dietary study with 3-month-old fish, which may have influenced the data interpretation. More importantly, the selenium residue at day 60 linked to reduced mortality in the water-borne study was 4.3 µg/g and in the diet study was 5.1 µg/g. These values are very close to each other, especially considering no standard deviation or standard error was given in Cleveland et al. (1993) for readers to judge the variation of the values. If toxicity were observed at 4.3 and 5.1 µg/g, then some concentration less than these would approach the toxic effects threshold. Consequently, the data in Cleveland et al. (1993) would also support a proposed threshold of 4 µg/g. URS (2000) used a USEPA procedure (Stephan et al., 1985) with data from Cleveland et al. (1993) to calculate a whole-body toxicity threshold for selenium of 3.4 µg/g for the dietary study and 3.3 µg/g for the water-borne study. Thus, they revealed, contrary to DeForest et al. (1999), that there was no difference between water-borne and dietary exposure of bluegill (*Lepomis macrochirus*).

2.5. Coldwater fish versus warmwater fish

Another flaw in the supposition of DeForest et al. (1999) that coldwater fish are more sensitive to selenium toxicity than warmwater fish is that they reviewed selected literature and not a more complete set of selenium publications. The result is that they recommend 6 µg/g as the whole-residue threshold for coldwater fish and 9 µg/g as the threshold for warmwater fish. Several studies in Tables 1 and 3 reveal that whole-body selenium residues of 4–6 µg/g cause adverse effects regardless of whether fish were coldwater or warmwater and regardless of the route of exposure (Hilton et al., 1980; Hilton and Hodson, 1983; Hunn et al., 1987; Hamilton et al., 1990, 1996, 2001a,b; USFWS, 1990; Cleveland et al., 1993; Lemly, 1993a,b,c). DeForest et al. (1999) have not provided an adequate foundation for differentiating the importance of whole-body selenium residues between coldwater fish and warmwater fish. If 4–6 µg/g causes adverse effects in fish, then some concentration lower should be selected as the threshold concentration, i.e., 4 µg/g, not 6 or 9 µg/g as proposed by DeForest et al. (1999).

Two other publications mention the possible differences between coldwater fish and warmwater fish (USDOI, 1998; URS, 2000). Table 32 in USDOI (1998), citing Lemly (1996), gives the no-effect selenium concentration for whole-body residues as <3 µg/g in warmwater fish and <2 µg/g in coldwater fish; the level of concern as 3–4 µg/g and 2–4 µg/g, respectively; and toxicity threshold as >4 µg/g for warmwater and coldwater fish. Although Lemly (1996) does not differentiate between warmwater and coldwater fish, USDOI (1998) cited Lemly (1996) and reported a slight difference in guideline values between warmwater and coldwater fish. Even so, the values in USDOI (1998) were less than those of DeForest et al. (1999), but similar to those reported by others (Maier and Knight, 1994; Hamilton, 2002). USDOI (1998) did not discuss the basis for suggesting a difference between warmwater and coldwater fish in their sensitivity to selenium toxicity.

URS (2000) also suggests the selenium literature has some evidence of coldwater fish being more sensitive to selenium than warmwater fish. They followed the USEPA method (Stephan et al., 1985) employed by DeForest et al. (1999) to calculate the selenium tissue threshold as the geometric mean of the no observable effect concentration (NOEC) and the lowest observable effect concentration (LOEC). Application of the procedure to day 60 data for bluegill from Cleveland et al. (1993) yielded a whole-body toxicity threshold of 3.4 µg/g in their dietary study. Using day 90 data for chinook salmon from Hamilton et al. (1990), URS (2000) reported a whole-body toxicity threshold of 1.5 µg/g. Thus, they concluded there was evidence of differences in sensitivity between warmwater fish (3.4) and coldwater fish (1.5).

However, URS (2000) seems to have used inappropriate data for chinook salmon in their calculation. They note that growth of chinook salmon was reduced at 30 and 60 days of exposure to the 3.2 µg/g SLD diet and then use the whole-body selenium residue at day 90 for that treatment in the USEPA method calculation (i.e., NOEC 0.8 µg/g and LOEC 2.7 µg/g). At day 90, growth was not reduced in the 3.2-µg/g diet treatment, but was reduced in the 5.6-µg/g diet treatment. For day 60 data (NOEC 0.9 µg/g, LOEC 3.3 µg/g) the geometric mean whole-body toxicity threshold is 1.7 for chinook salmon. If day 60 data from Hamilton et al. (1990) were used in the comparison, one might still conclude there was a difference in sensitivity between coldwater fish with a threshold of 1.7 and warmwater fish with a threshold of 3.4 (Cleveland et al., 1993). However, if day 90 data were used, there would be no difference between coldwater fish with a whole-body toxicity threshold of 3.3 (NOEC 2.7 µg/g, LOEC 4.0 µg/g; Hamilton et al., 1990) and warmwater fish with a threshold of 3.9 (NOEC 3.3 µg/g, LOEC 4.6 µg/g; Cleveland et al., 1993). Considering the incongruity between day 60 and day 90

data from these two studies, there seems to be little support for differentiating sensitivity to selenium toxicity between coldwater and warmwater fish.

2.6. Diet selenium threshold

DeForest et al. (1999) proposed a dietary selenium threshold of 11 µg/g for coldwater fish and 10 µg/g for warmwater fish. The available information suggests similar sensitivity between coldwater fish and warmwater fish to dietary selenium toxicity. Tables 2 and 4 reveal that 4.6–6.5 µg/g dietary selenium causes adverse effects in fish regardless of whether they are coldwater species or warmwater species (Hamilton et al., 1989, 1990, 2001a, b; USFWS, 1990; Cleveland et al., 1993; Lemly, 1993a, b). If these dietary concentrations cause adverse effects in fish, primarily mortality, then a lower concentration must be selected as a dietary threshold concentration, i.e., 3 µg/g.

Professional judgment is an important consideration in the interpretation of data that can be frequently difficult and complex, conflicting or ambiguous, or incomplete (USEPA, 1992). Over 20 years ago, Hilton and colleagues conducted several selenium toxicity studies in the late 1970s and early 1980s and, based on their scientific judgment, they hypothesized that >3 µg/g dietary selenium would be harmful to fish over the long term (Hilton et al., 1980). Research in the late 1980s through the early 2000s has substantiated the speculation of John Hilton and colleagues.

3. Divergence of selenium thresholds

Much of the controversy in recent years concerning the selenium criterion for aquatic life and the dichotomy in proposed toxicity thresholds has been between government/academia published papers and nongovernmental papers. It is incumbent on federal government scientists to be an advocate for the environment on behalf of the general public as stated in the mission statement of the US Department of the Interior. Some may state this is a biased position. The chief biologist of the National Biological Service (NBS), and later the Biological Resources Division of the US Geological Survey, Dennis Fenn noted that the line is thin between judgment informed by sound scientific data and speculative judgment based on little data and much personal interest (Fenn and Milton, 1997); yet he concluded NBS scientists must be advocates for the environment (Fenn and Milton, 1997; Fenn, 1997). As Fenn stated, a basic premise of the scientific method is that the scientist has no vested interest in the outcome of the observations.

DeForest et al. (1999) have attempted to critically evaluate selenium thresholds for fish. Others have attempted similar critical evaluations of thresholds using

limited datasets for fish (Brix et al., 2000) and birds (Adams et al., 1998, 2000; Fairbrother et al., 1999). Skorupa (1999) critiqued the article by Fairbrother et al. (1999) and noted the selective use of data from several studies that resulted in higher selenium threshold values for birds than proposed by government researchers. Fairbrother et al. (2000), in turn, responded to Skorupa (1999). Skorupa (personal communication) had similar comments on the draft of Adams et al. (1998). Articles that use limited datasets do little to enhance the body of knowledge about selenium. In contrast, to meet our responsibilities as federal researchers for stewardship of our natural resources for the benefit of our citizens, it is incumbent on us to ensure that the full range of relevant information is acquired and presented to the public. This responsibility requires us to not only point out deficiencies of selective information presented in scientific papers such as DeForest et al. (1999) and Brix et al. (2000), yet work to complement their data with the widest possible range of data.

Arguments in the articles by DeForest et al. (1999), Brix et al. (2000), Fairbrother et al. (1999), and Adams et al. (1998) for high threshold values were supported by statistics. However, Skorupa (1999) pointed out how selective use of data points can lead to the arrival at erroneous conclusions. Many of the concerns raised in this critique of DeForest et al. (1999) match those expressed by Stoto (1990) who noted that errors in conclusions could result from incomplete and inaccurate reporting of data, i.e., incomplete and inaccurate review of the selenium literature.

4. Conclusions

DeForest et al. (1999) and Brix et al. (2000) have used selective data to present high toxicity threshold for selenium in the tissue and diet of fish. They have cited older literature containing errors (Lemly, 1993a) while omitting later literature with corrected values (Lemly, 1996), excluded data from publications based on minor justifications, and overlooked key studies from the extensive body of selenium literature. The proposed high-selenium thresholds by DeForest et al. (1999) and Brix et al. (2000) does not stand on equal footing with reviews of more extensive datasets by USDOI (1998), Lemly (1996), Maier and Knight (1994), and Hamilton (2002). Recent studies continue to support the dietary selenium threshold of 3 µg/g and the whole-body selenium threshold of 4 µg/g for fish.

Acknowledgments

I thank W. Beckon, K. Maier, and T. Presser for reviewing the article.

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Christopher
Hunter/DC/USEPA/US
12/29/2010 11:40 AM

To Gregory Peck
cc Denise Keehner, kevin.minoli, Matthew Klasen, Palmer
Hough, Brian Frazer, David Evans, Jim Pendergast
bcc
Subject Re: Fw: Draft Spruce PR

Thanks Greg,

This was the first time I was able to look at the press release, and since there will probably be further revisions from OPA, I wanted to make a couple of clarifying comments before the next round.

Chris



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Draft Spruce Release v.2 - CH.docx

Chris Hunter
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Gregory Peck

Betsaida Attached is an updated version of the d...

12/29/2010 09:27:07 AM

From: Gregory Peck/DC/USEPA/US
To:
Cc: Adora Andy/DC/USEPA/US@EPA, Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, (b) (6) Kevin Minoli, Matthew Klasen/DC/USEPA/US@EPA, stoner.nancy@epa.gov
Date: 12/29/2010 09:27 AM
Subject: Re: Fw: Draft Spruce PR

Betsaida

Attached is an updated version of the draft Spruce Press Release. Please let us know if you have any questions.

Best,
Greg

[attachment "2010-12-29 Draft Spruce Release v.2.docx" deleted by Christopher Hunter/DC/USEPA/US]

Gregory Peck

Betsaida: Hope you had (or are having) a great...

12/28/2010 10:02:17 AM

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA
Cc: stoner.nancy@epa.gov, Denise Keehner/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/28/2010 10:02 AM
Subject: Fw: Draft Spruce PR

Betsaida:

Hope you had (or are having) a great Christmas break. Am resending you the draft PR for the Spruce announcement in case you had not seen it. We're also working to prepare talking points, key messages,

and Q's and A's which we'll get to you early next week. As we discussed - we're pointing to a Jan. 11 release.

Let us know if you have any questions.

Best,
Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/28/2010 09:56 AM -----

From: Gregory Peck/DC/USEPA/US
To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov
Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli
Date: 12/19/2010 11:59 AM
Subject: Draft Spruce PR

Attached is an initial cut at a press release for the Spruce veto. Wanted to get you something early to begin chewing on. (b) (5) ACP We'll be working on the remainder of the communications package during the next week, including Q's and A's, key messages, talking points, and outreach to coordinate support. Also working with Arvin and his staff. Shooting for a Dec 30th release.

We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg

[attachment "2010-12-19 Draft Spruce Release v.1.docx" deleted by Gregory Peck/DC/USEPA/US]

Christopher
Hunter/DC/USEPA/US
12/29/2010 12:49 PM

To: Matthew Klasen
cc: Stefania Shamet
bcc:
Subject: Re: Fw: Suggested correction to Response #152 -- Re: HW
RD Comments 1A-67A

Thanks. I hadn't caught that. I'll revise the PD draft. Palmer is nearly through with his review too, and once I incorporate his edits, I'll send around a clean version to all.

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Matthew Klasen Hey Chris, You may have noticed this already --... 12/29/2010 12:08:03 PM

From: Matthew Klasen/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 12:08 PM
Subject: Fw: Suggested correction to Response #152 -- Re: HW RD Comments 1A-67A

Hey Chris,

You may have noticed this already -- but just wanted to flag this comment from Frank, which is actually an edit to a PD comment, not an RD comment. It confused me for a while till I figured that out.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/29/2010 12:07 PM -----

From: Frank Borsuk/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/29/2010 07:26 AM
Subject: Suggested correction to Response #152 -- Re: HW RD Comments 1A-67A

(b) (5)

(b) (5)

Frank

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Stefania Shamet

(b) (5)

12/29/2010 05:15:54 AM

From: Stefania Shamet/R3/USEPA/US
To: David Kargbo/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/29/2010 05:15 AM
Subject: Re: HW RD Comments 1A-67A

(b) (5)

(b) (5)

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)

David Kargbo

Stef; (b) (5)

12/28/2010 01:38:32 PM

From: David Kargbo/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/28/2010 01:38 PM
Subject: Re: HW RD Comments 1A-67A

Stef;

(b) (5)

Dave

David M. Kargbo, PhD
Office of Environmental Innovation
Environmental Assessment and Innovation Division
USEPA Region 3
1650 Arch Street
Philadelphia, PA 19103
Tel: 215 814-3319 / E-mail: kargbo.david@epa.gov

Stefania Shamet Dave -- again, thanks. Any thoughts on 14A? Th... 12/28/2010 11:32:03 AM

From: Stefania Shamet/R3/USEPA/US
To: David Kargbo/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/28/2010 11:32 AM
Subject: Re: HW RD Comments 1A-67A

Dave -- again, thanks. Any thoughts on 14A? Thanks again.

David Kargbo Stef; (b) (5) 12/28/2010 10:42:20 AM

From: David Kargbo/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/28/2010 10:42 AM
Subject: Re: HW RD Comments 1A-67A

Stef;

(b) (5)



David M. Kargbo, PhD
Office of Environmental Innovation
Environmental Assessment and Innovation Division
USEPA Region 3

1650 Arch Street
Philadelphia, PA 19103
Tel: 215 814-3319 / E-mail: kargbo.david@epa.gov

Stefania Shamet

Matt -- as promised -- here are draft responses fr...

12/28/2010 06:52:38 AM

From: Stefania Shamet/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: David Kargbo/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Dave Campbell/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA
Date: 12/28/2010 06:52 AM
Subject: HW RD Comments 1A-67A

Matt -- as promised -- here are draft responses from the 1A-67A set. These include draft responses for all

(b) (5)

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

Thanks.

[attachment "Hunton-Williams Comments_1-68SDSCOMPARE.doc" deleted by Stefania Shamet/R3/USEPA/US]

Palmer Hough/DC/USEPA/US

To Christopher Hunter

12/29/2010 02:09 PM

cc

bcc

Subject edits to PD RTC

Chris:

This looks really good, makes me feel even better about the whole effort. Aside from the comments already flagged by Kevin and Stef, I only had a few minor suggestions and typos.

Let me know if you have any questions.

-Palmer



ATTACHMENT REDACTED - DELIBERATIVE

Spruce PD comment responses 1-179 12-28-10_pfh edits.doc

Palmer Hough, Environmental Scientist
tel: 202.566.1374 | fax: 202.566.1375

Wetlands Division
U.S. EPA Headquarters (MC 4502T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
www.epa.gov/wetlands

David Rider/R3/USEPA/US
12/29/2010 04:09 PM

To Frank Borsuk
cc borsuk.frank, Frank Borsuk, Margaret Passmore, Stefania Shamet
bcc
Subject Re: Response to 67(a) - - Re: HW RD Comments 1A-67A

Frank,

(b) (5)

Dave

Re: Response to 67(a) - - Re: HW RD Comments 1A-67A

Re: Response to 67(a) - - Re: HW RD Comments 1A-67A 📎

Frank Borsuk to: Frank Borsuk

12/28/10 04:31 PM

Cc: borsuk.frank, David Rider, Margaret Passmore, Stefania Shamet

(b) (5)

[Redacted content]

[Redacted content]

[Redacted content]

(b) (5)



Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Matthew
Klasen/DC/USEPA/US
12/29/2010 04:10 PM

To Susan Cormier, Glenn Suter
cc Michael Slimak
bcc
Subject Fw: 202a

Susan and Glenn,

See below for a draft response on a Spruce comment with respect to fish and the benchmark. Can you take a look and let us know if you're ok with this?

(This will go through subsequent rounds of review, so you should have a chance to review other benchmark-related answers either later this week or early next week.)

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/29/2010 04:08 PM -----

From: Margaret Passmore/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Date: 12/29/2010 01:30 PM
Subject: 202a

Stef,

(b) (5)



(b) (5)

A large rectangular area of the document is completely redacted with black ink. It covers the top half of the page, starting below the (b) (5) label and extending down to just above the contact information.

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Cynthia
Giles-AA/DC/USEPA/US
12/29/2010 04:13 PM

To John Pomponio, "Smith, Chip R Mr CIV USA ASA CW",
Cimorelli, Alan, Cliff Rader, Cynthia Stahl, Janet Kremer,
Jeffrey Lapp, John Forren, "Pizarchik, Joseph G", Linda
Huffman, Mazzarella, Christine, "Boots, Michael J.", Nancy
Stoner, Richard Paiste, "Salt, Terrence C SES CIV USA ASA
CW", Samantha Beers, William Early, Gregory Peck, Bob
Sussman

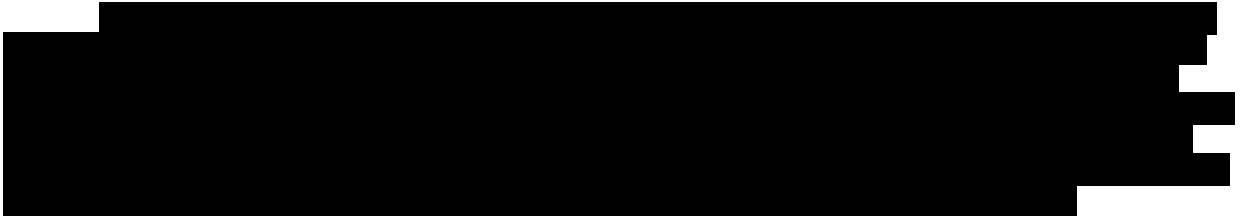
cc

bcc

Subject Cumulative impacts follow up

Thank you all for taking the time to meet on December 13 to talk about how we can improve cumulative effects analyses for surface coal mining proposals in Appalachia. This is a quick summary of next steps and schedule to which we agreed at the meeting. Please forward to anyone I have inadvertently omitted from the address list.

(b) (5)



Thanks again for working together on this important project and I look forward to our next check in at CEQ in January. Best to all for the new year -

Cynthia

Cynthia Giles
Assistant Administrator
U.S. EPA, Office of Enforcement and Compliance Assurance
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460
202-564-2440

THIS MESSAGE IS CONFIDENTIAL and may contain legally privileged information. If you receive it in error, please delete it immediately, do not copy, and notify the sender. Thank you.

Jennifer Fulton/R3/USEPA/US

To Christine Mazzarella, Christopher Hunter

12/29/2010 04:32 PM

cc

bcc

Subject revisions to cumulative impacts appendix

I made a few changes to the CI appendix. Most notably, I found a problem in the thresholds used to create the maps, so this includes updated maps.



ATTACHMENT REDACTED - DELIBERATIVE

Appendix_5_Cumulative_Impacts_122810_JBFedits.doc

Jennifer B. Fulton
Aquatic Biologist
Office of Monitoring and Assessment
U.S. EPA Region III
1060 Chapline St., Suite 303
Wheeling, WV 26003-2995
304-234-0248 Phone
304-234-0260 Fax
Fulton.Jennifer@epa.gov

Learn more about the Office of Monitoring & Assessment at:
<http://epa.gov/reg3esd1/3ea50.htm>

**Matthew
Klasen/DC/USEPA/US**

12/29/2010 04:51 PM

To Matthew Klasen

cc

bcc

Subject



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Compiled H&W Comments.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher
Hunter/DC/USEPA/US
12/29/2010 05:05 PM

To: Matthew Klasen
cc: Palmer Hough
bcc:
Subject: Re: Current RD comments draft for R3 review

And a compiled PD Response to Comments document for you as well. Reviewed by WD, R3, OGC. This one still has a couple of comments for R3 to track down, but I think they are the only ones with outstanding changes due. Let me know if you need anything else on this, and I'll start reviewing the RD.

Thanks,
Chris



ATTACHMENT REDACTED - DELIBERATIVE

Spruce PD comment responses 1-179 122910.doc

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Matthew Klasen

[Hi folks, So here's the consolidated comment dr...](#)

12/29/2010 04:50:53 PM

From: Matthew Klasen/DC/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/29/2010 04:50 PM
Subject: Current RD comments draft for R3 review

Hi folks,

So here's the consolidated comment draft as it currently stands, to help facilitate more timely review. I've included only 1-242 (all the comments except mitigation), and I've updated the spreadsheet to reflect where I think things stand with responses on 1-242.

As I mentioned, Stef is still working on the middle section and should have responses by tomorrow morning.

Please make sure to send me comments in **Track Changes** from here on out, or this will be impossible to deal with dueling versions.

I'll be spending tomorrow finishing re-numbering of 243 to the end, incorporating Stef's updated comments, and incorporating comments from Greg Peck on the mitigation section, in preparation for distributing the compiled version a bit more widely by COB tomorrow.

Let me know if you have any questions.

Thanks,
Matt

[attachment "2010-12-29 Compiled H&W RD Comments 1-242.docx" deleted by Christopher Hunter/DC/USEPA/US]

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen Hey John, More holiday work definitely isn't what... 12/29/2010 03:50:30 PM

From: Matthew Klasen/DC/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Frank Borsuk/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 03:50 PM
Subject: Re: Expedited receipt

Hey John,

More holiday work definitely isn't what we're looking for, so I understand the urgency.

I'm currently in the process of reformatting everything to ensure all the numbers line up and are consistent with PD comments. I'll be done with 1-242 by about 4:30 or so. (1-242 includes all the parts that Wheeling put together.) If this seems OK, I'll send you the full set of 1-242 at around 4:30 (I'll be leaving the office a bit early today).

Stef, please let us know if this is a problem from your end, as I know you're working through the middle section (68-242) and were planning to send updates later today or tomorrow. You're better able to clarify whether it would be better for folks to wait for the updated version, or to get a head start on what we currently have but possibly duplicate a portion of the effort.

I'll plan on the "send around 1-242 this afternoon" plan unless I hear otherwise.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

John Forren Matt: My apologies for not being on the 930 am c... 12/29/2010 03:28:46 PM

From: John Forren/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA
Date: 12/29/2010 03:28 PM
Subject: Expedited receipt

Matt:

My apologies for not being on the 930 am call - I was in the office but for some reason, I didn't have it on my calendar.

Is there any way that portions of the comprehensive set of responses, particularly those that need review by our folks, can be sent out before tomorrow afternoon? I wouldn't want those folks to be set up again to work on their holiday and weekend time off. They've already been through that a couple times already -- as I'm sure others in HQ have as well.

I would really appreciate any efforts you can make to expedite sending those portions for their review.

Thanks, Matt.

John

Matthew Klasen	Thanks Maggie; I'll add this in. By the way, at ou...	12/29/2010 01:46:24 PM
----------------	---	------------------------

From: Matthew Klasen/DC/USEPA/US
To: Margaret Passmore/R3/USEPA/US@EPA
Cc: Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 01:46 PM
Subject: Re: 201a

Thanks Maggie; I'll add this in.

By the way, at our 9:30 call this morning, we settled on a plan to send around the compiled set of RD comments and responses to the group tomorrow. I know Greg asked last night about when it would make sense to send something around. By tomorrow afternoon, we'll have a pretty comprehensive set of responses to all three sections of the responses (1-67, 68-242, and 243-end). This will include Stef's work on the middle part of the document and HQ review of the mitigation section.

This should provide a chance for you guys to make sure I've captured everything in the flurry of messages that have gone around.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Margaret Passmore	This one appears to be a repeat, or closely rela...	12/29/2010 01:42:41 PM
-------------------	---	------------------------

From: Margaret Passmore/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Date: 12/29/2010 01:42 PM
Subject: 201a

(b) (5)

201a. EPA Provides No Information To Suggest That Trophic Function or

Higher Order Biota, or any 404(c) resource **Will Be Disrupted by** alleged impacts to macroinvertebrates. Indeed, the Recommended Determination does not once claim that a shift in the relative abundance of certain species of EPT is correlated with the populations or health of any of the 404(c) resources.

(b) (5)



Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Christopher
Hunter/DC/USEPA/US
12/29/2010 05:07 PM

To Palmer Hough
cc
bcc
Subject Fw: Current RD comments draft for R3 review

In case you need something to read as the hangover fades on New Year's Day.

I'm planning on reviewing Sunday (and maybe some tomorrow), so don't feel obligated. If you do take a look, I'm most interested in flagging the items we'll need to fold back into the FD and appendices.

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/29/2010 05:05 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/29/2010 04:50 PM
Subject: Current RD comments draft for R3 review

Hi folks,

So here's the consolidated comment draft as it currently stands, to help facilitate more timely review. I've included only 1-242 (all the comments except mitigation), and I've updated the spreadsheet to reflect where I think things stand with responses on 1-242.

As I mentioned, Stef is still working on the middle section and should have responses by tomorrow morning.

Please make sure to send me comments in **Track Changes** from here on out, or this will be impossible to deal with dueling versions.

I'll be spending tomorrow finishing re-numbering of 243 to the end, incorporating Stef's updated comments, and incorporating comments from Greg Peck on the mitigation section, in preparation for distributing the compiled version a bit more widely by COB tomorrow.

Let me know if you have any questions.

Thanks,
Matt



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Compiled H&W RD Comments 1-242.docx

Matt Klasen

U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen

Hey John, More holiday work definitely isn't what...

12/29/2010 03:50:30 PM

From: Matthew Klasen/DC/USEPA/US
To: John Forren/R3/USEPA/US@EPA
Cc: Frank Borsuk/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 03:50 PM
Subject: Re: Expedited receipt

Hey John,

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I'll plan on the "send around 1-242 this afternoon" plan unless I hear otherwise.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

John Forren

Matt: My apologies for not being on the 930 am c...

12/29/2010 03:28:46 PM

From: John Forren/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA
Date: 12/29/2010 03:28 PM
Subject: Expedited receipt

Matt:

My apologies for not being on the 930 am call - I was in the office but for some reason, I didn't have it on my calendar.

Is there any way that portions of the comprehensive set of responses, particularly those that need review by our folks, can be sent out before tomorrow afternoon? I wouldn't want those folks to be set up again to

work on their holiday and weekend time off. They've already been through that a couple times already -- as I'm sure others in HQ have as well.

I would really appreciate any efforts you can make to expedite sending those portions for their review.

Thanks, Matt.

John

Matthew Klasen

Thanks Maggie; I'll add this in. By the way, at ou...

12/29/2010 01:46:24 PM

From: Matthew Klasen/DC/USEPA/US
To: Margaret Passmore/R3/USEPA/US@EPA
Cc: Greg Pond/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 01:46 PM
Subject: Re: 201a

Thanks Maggie; I'll add this in.

By the way, at our 9:30 call this morning, we settled on a plan to send around the compiled set of RD comments and responses to the group tomorrow. I know Greg asked last night about when it would make sense to send something around. By tomorrow afternoon, we'll have a pretty comprehensive set of responses to all three sections of the responses (1-67, 68-242, and 243-end). This will include Stef's work on the middle part of the document and HQ review of the mitigation section.

This should provide a chance for you guys to make sure I've captured everything in the flurry of messages that have gone around.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Margaret Passmore

This one appears to be a repeat, or closely rela...

12/29/2010 01:42:41 PM

From: Margaret Passmore/R3/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Date: 12/29/2010 01:42 PM
Subject: 201a

(b) (5)

201a. EPA Provides No Information To Suggest That Trophic Function or Higher Order Biota, or any 404(c) resource **Will Be Disrupted by** alleged impacts to macroinvertebrates. Indeed, the Recommended Determination does not once

claim that a shift in the relative abundance of certain species of EPT is correlated with the populations or health of any of the 404(c) resources.

(b) (5)



Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Ann Williams
(b)(6) Ann Williams
12/29/2010 09:01 PM

To Christopher Hunter
cc Ann Williams, Palmer Hough
bcc
Subject Re: Revised Spruce FD

Hi Chris and Palmer,

(b) (5)

Take care, and keep me posted.

Ann

On Wed, Dec 29, 2010 at 11:15 AM, <Hunter.Christopher@epamail.epa.gov> wrote:

Many thanks, Ann. (b) (5)

Thanks again for your help. Hope you got dug out without too much back strain.

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

|----->
| From: |
|----->

>

|----->
| Ann Williams (b) (6) Ann Williams
|

>

|----->
|----->
| To: |
|----->

>-----
-----|
|Christopher Hunter/DC/USEPA/US@EPA
|
>-----
-----|
|----->
|Cc: |
|----->
>-----
-----|
|Ann Williams/R1/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
|
>-----
-----|
|----->
|Date: |
|----->
>-----
-----|
|12/28/2010 09:57 PM
|
>-----
-----|
|----->
|Subject: |
|----->
>-----
-----|
|Re: Revised Spruce FD
|
>-----
-----|

Dear Chris and Palmer,

First, I just want to reiterate that this draft is greatly improved and looks very good. I've made some specific comments on the document, but here are some general comments.

(b) (5)



(b) (5)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(b) (5)




OK, that's it. I hope my remaining comments on the attached are helpful.

Ann

On Thu, Dec 23, 2010 at 12:34 PM, <Hunter.Christopher@epamail.epa.gov> wrote:

Hi Ann,

I hope you're enjoying the holiday season (I say as I ask for work help). Palmer and I really appreciated the comments you provided us on the draft Spruce 404c Final Determination, they were very insightful and

helpful (b) (5)



If you have a few minutes and would be willing to look at the new version, it would be great to hear about that comment, or any other concerns you'd like to flag. Thanks again and happy holidays!

Chris

(See attached file: Spruce FD 122210 draft.doc)

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov

[attachment "Spruce FD 122210 draft(2)(AW edits).doc" deleted by
Christopher Hunter/DC/USEPA/US]

Matthew
Klasen/DC/USEPA/US
12/29/2010 09:08 PM

To "Christopher Hunter"
cc "Stefania Shamet", "John Forren", Hough.Palmer, "Greg
Pond"
bcc
Subject Fw: my comments on the PD response to comments

Hey Chris,

See below from Maggie re: comments on the PD.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
Margaret Passmore

----- Original Message -----

From: Margaret Passmore
Sent: 12/29/2010 05:01 PM EST
To: Matthew Klasen; Stefania Shamet
Cc: John Forren; Greg Pond
Subject: my comments on the PD response to comments

Matt and Stef,

I am not sure who these should go to. Please forward as appropriate.

M



ATTACHMENT REDACTED - DELIBERATIVE

Spruce_PD_comment_responses_1-179_12-28-10[1]_MP_122910.doc

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Stefania
Shamet/R3/USEPA/US
12/29/2010 10:24 PM

To Matthew Klasen
cc borsuk.frank, Christopher Hunter, David Kargbo, David Rider,
Frank Borsuk, John Forren, Margaret Passmore
bcc
Subject Re: (b) (5)

Absolutely agree. Thanks.

Matthew Klasen This seems to me like something we need OST'... 12/29/2010 12:51:10 PM

From: Matthew Klasen/DC/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA
Cc: borsuk.frank@epa.gov, Christopher Hunter/DC/USEPA/US@EPA, David
Kargbo/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania
Shamet/R3/USEPA/US@EPA
Date: 12/29/2010 12:51 PM
Subject: Re: (b) (5)

This seems to me like something we need OST's input on. If it works for everyone, I'll forward this discussion to Betsy Behl, Joe Beaman, and Charlie Delos this afternoon to get their input.

(b) (5)

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Frank Borsuk (b) (5) ... 12/29/2010 11:21:48 AM

David Rider/R3/USEPA/US
12/30/2010 06:46 AM

To Stefania Shamet
cc Christopher Hunter, David Kargbo, Frank Borsuk, John
Forren, Margaret Passmore, Matthew Klasen
bcc
Subject Re: new DMRs - Spruce No. 1

Stef,

(b) (5)

Dave

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 📎

Stefania Shamet to: David Rider

12/30/10 06:02 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret
Passmore, Matthew Klasen

(b) (5)

David Rider All, Additional 6 months of selenium for WV1017... 12/30/2010 05:53:40 AM

From: David Rider/R3/USEPA/US
To: Frank Borsuk/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew
Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 05:53 AM
Subject: new DMRs - Spruce No. 1

All,

(b) (5)

Dave

David E. Rider
US Environmental Protection Agency
1650 Arch Street (3EA50)
Philadelphia, PA 19103-2029
215-814-2787

[attachment "Table A2der_12-30-10.doc" deleted by Stefania Shamet/R3/USEPA/US]

David Rider/R3/USEPA/US

12/30/2010 08:45 AM

To Stefania Shamet

cc Christopher Hunter, David Kargbo, Frank Borsuk, John
Forren, Margaret Passmore, Matthew Klasen

bcc

Subject Re: new DMRs - Spruce No. 1

Stef,

(b) (5)



Stefania Shamet to: David Rider

12/30/10 07:10 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret Passmore, Matthew Klasen

(b) (5)

David Rider

(b) (5)


12/30/2010 06:46:06 AM

From: David Rider/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 06:46 AM
Subject: Re: new DMRs - Spruce No. 1

(b)

(5)

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 

Stefania Shamet to: David Rider

12/30/10 06:02 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret Passmore, Matthew Klasen

(b) (5)

David Rider

All (b) (5)

12/30/2010 05:53:40 AM

From: David Rider/R3/USEPA/US

To: Frank Borsuk/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew
Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 05:53 AM
Subject: new DMRs - Spruce No. 1

All,

(b) (5)



Dave

David E. Rider
US Environmental Protection Agency
1650 Arch Street (3EA50)
Philadelphia, PA 19103-2029
215-814-2787

[attachment "Table A2der_12-30-10.doc" deleted by Stefania Shamet/R3/USEPA/US]

David Rider/R3/USEPA/US

12/30/2010 08:45 AM

To Stefania Shamet

cc Christopher Hunter, David Kargbo, Frank Borsuk, John
Forren, Margaret Passmore, Matthew Klasen

bcc

Subject Re: new DMRs - Spruce No. 1

Stef,

(b) (5)



Stefania Shamet to: David Rider

12/30/10 07:10 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret Passmore, Matthew Klasen

(b) (5)

David Rider


(b) (5)

12/30/2010 06:46:06 AM

From: David Rider/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 06:46 AM
Subject: Re: new DMRs - Spruce No. 1

(b)
(5)

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 

Stefania Shamet to: David Rider

12/30/10 06:02 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret Passmore, Matthew Klasen

(b) (5)

David Rider

All, (b) (5)

12/30/2010 05:53:40 AM

From: David Rider/R3/USEPA/US

To: Frank Borsuk/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, John
Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew
Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 05:53 AM
Subject: new DMRs - Spruce No. 1

All,

(b) (5)



Dave

David E. Rider
US Environmental Protection Agency
1650 Arch Street (3EA50)
Philadelphia, PA 19103-2029
215-814-2787

[attachment "Table A2der_12-30-10.doc" deleted by Stefania Shamet/R3/USEPA/US]

David Rider/R3/USEPA/US
12/30/2010 08:53 AM

To Margaret Passmore
cc Jennifer Fulton, Stefania Shamet
bcc
Subject Re: new DMRs - Spruce No. 1

Maggie,

I am not in the office but will try to track down the report. (b) (5)

Dave

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 📎

Margaret Passmore to: Stefania Shamet

12/30/10 08:14 AM

Cc: David Rider, Jennifer Fulton

(b) (5)

-----Stefania Shamet/R3/USEPA/US wrote: -----

To: David Rider/R3/USEPA/US@EPA
From: Stefania Shamet/R3/USEPA/US
Date: 12/30/2010 07:10AM
Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Subject: Re: new DMRs - Spruce No. 1

(b) (5)

David Rider---12/30/2010 06:46:06 AM---Stef, (b) (5)

From David Rider/R3/USEPA/US

:

To: Stefania Shamet/R3/USEPA/US@EPA

Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA

Date: 12/30/2010 06:46 AM

Subj Re: new DMRs - Spruce No. 1

ect:

Stef,

(b) (5)



Dave

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 [Link](#)

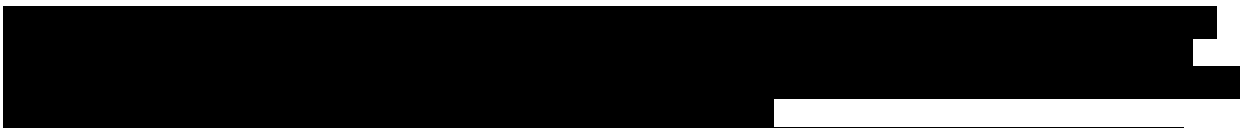
Stefania Shamet

to: David Rider

12/30/10 06:02 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret Passmore, Matthew Klasen

(b) (5)



David Rider---12/30/2010 05:53:40 AM---All, (b) (5)



From David Rider/R3/USEPA/US

:

To: Frank Borsuk/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA

Cc: Christopher Hunter/DC/USEPA/US@EPA, David Kargbo/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA

Date: 12/30/2010 05:53 AM

Subj new DMRs - Spruce No. 1

ect:

All,

(b) (5)



Dave

David E. Rider
US Environmental Protection Agency
1650 Arch Street (3EA50)
Philadelphia, PA 19103-2029
215-814-2787

[attachment "Table A2der_12-30-10.doc" deleted by Stefania Shamet/R3/USEPA/US]

Gregory Peck/DC/USEPA/US

12/30/2010 09:30 AM

To Matthew Klasen

cc

bcc

Subject Fw: Draft Spruce PR

(b) (5)

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/30/2010 09:28 AM -----

From: Nancy Stoner/DC/USEPA/US
To: "Gregory Peck" <Peck.Gregory@epamail.epa.gov>, Denise Keehner/DC/USEPA/US@EPA
Date: 12/30/2010 08:49 AM
Subject: Fw: Draft Spruce PR

(b) (5)

-----Forwarded by Nancy Stoner/DC/USEPA/US on 12/30/2010 08:48AM -----

To: "Nancy Stoner" <Stoner.Nancy@epamail.epa.gov>
From: Nancy Stoner/DC/USEPA/US
Date: 12/28/2010 01:18PM
Subject: Fw: Draft Spruce PR

Gregory Peck

----- Original Message -----

From: Gregory Peck
Sent: 12/28/2010 10:02 AM EST
To: Betsaida Alcantara; Brendan Gilfillan; Adora Andy
Cc: stoner.nancy@epa.gov; Denise Keehner; Matthew Klasen; Christopher Hunter; (b)(6) Kevin Minoli
Subject: Fw: Draft Spruce PR

Betsaida:

Hope you had (or are having) a great Christmas break. Am resending you the draft PR for the Spruce announcement in case you had not seen it. We're also working to prepare talking points, key messages, and Q's and A's which we'll get to you early next week. As we discussed - we're pointing to a Jan. 11 release.

Let us know if you have any questions.

Best,
Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/28/2010 09:56 AM -----

Fro Gregory Peck/DC/USEPA/US

m:

To: Betsaida Alcantara/DC/USEPA/US@EPA, Brendan Gilfillan/DC/USEPA/US@EPA, Adora Andy/DC/USEPA/US@EPA, ganesan.arvin@epa.gov

Cc: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA,

Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b)(6) Kevin Minoli
Dat 12/19/2010 11:59 AM
e:
Sub Draft Spruce PR
ject:

Attached is an initial cut at a press release for the Spruce veto. Wanted to get you something early to begin chewing on. (b) (5) ACP We'll be working on the remainder of the communications package during the next week, including Q's and A's, key messages, talking points, and outreach to coordinate support. Also working with Arvin and his staff. Shooting for a Dec 30th release.

We included a draft quote for Pete. Let us know if you want us to draft something for LPJ.

Feel free to call Matt or me if you have any questions.

Greg

(See attached file: 2010-12-19 Draft Spruce Release v.1.docx)



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-19 Draft Spruce Release v.1.docx

David Rider/R3/USEPA/US
12/30/2010 09:32 AM


To Stefania Shamet
cc Christopher Hunter, David Kargbo, Frank Borsuk, Jennifer
Fulton, John Forren, Margaret Passmore, Matthew Klasen
bcc
Subject Re: new DMRs - Spruce No. 1

Stef,

That looks just right. (b) (5)

Dave

Re: new DMRs - Spruce No. 1

Re: new DMRs - Spruce No. 1 

Stefania Shamet to: David Rider

12/30/10 08:59 AM

Cc: Christopher Hunter, David Kargbo, Frank Borsuk, John Forren, Margaret
Passmore, Matthew Klasen, Jennifer Fulton

(b) (5)



(b) (5)

A 20x20 grid representing a 2D map. The grid contains black and yellow obstacles. The black obstacles are located at the top (rows 1-3), along the left edge (rows 4-19, column 1), and in several vertical columns (columns 3, 5, 7, 9, 11, 13, 15, 17, 19). The yellow obstacles are located in a horizontal band across the middle (rows 10-12, columns 10-19) and in a vertical band on the right (columns 10-19, rows 10-12). The remaining cells are white.

Carrie Traver/R3/USEPA/US

12/30/2010 10:01 AM

To Marcel Tchaou

cc

bcc

Subject Re: Fw: References Cited for Spruce

No problem. I do have an updated reference list, and I also have a list of references that aren't on it. Here is the most updated reference list.



ATTACHMENT REDACTED - DELIBERATIVE

Revised Reference List.doc

I think Chris Hunter forwarded you the list of references that I saw cited in the FD but were not on the Reference list. A few of them have been resolved since yesterday.

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Marcel Tchaou

Sorry I did not reply to this message. I meant to...

12/30/2010 09:43:27 AM

From: Marcel Tchaou/DC/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Date: 12/30/2010 09:43 AM
Subject: Re: Fw: References Cited for Spruce

Sorry I did not reply to this message. I meant to but things here got hectic. I was waiting to finalize the references that is now Appendix 7. Some references cited in the FD are not in the Appendix so I am going through the FD to make sure that all is fixed.
Kind Regards

Marcel K. Tchaou, Ph.D., P.E., P.H.
Environmental Engineer
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1904

Carrie Traver/R3/USEPA/US

12/30/2010 10:24 AM

To Christopher Hunter

cc Marcel Tchaou

bcc

Subject Re: Appendices 2/2

Thanks, Chris.

There were also some citation corrections that were done in the FD but needed to be carried over to the Comment/Response document. Since everyone is busy, I took the liberty of marking the changes while looking for references yesterday.

FYI - I realized that the "EPA 2007" citation I listed in Response#46 was actually one of the corrections that needed to be made.



ATTACHMENT REDACTED - DELIBERATIVE

Spruce_PD_comment_responses_1-179_12-28-10[1]ref.doc

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Christopher Hunter

Thanks Carrie, I've incorporated your changes t...

12/29/2010 01:34:15 PM

From: Christopher Hunter/DC/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Cc: Carrie Traver/R3/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/29/2010 01:34 PM
Subject: Re: Appendices 2/2

Thanks Carrie, I've incorporated your changes to the 4 appendices.

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Carrie Traver

Carrie Traver USEPA Region 3

12/29/2010 12:06:59 PM

From: Carrie Traver/R3/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA

Cc: Christopher Hunter/DC/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/29/2010 12:06 PM
Subject: Re: Appendices 2/2

[attachment "Appendices 3-4.ZIP" deleted by Christopher Hunter/DC/USEPA/US]

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Carrie Traver

Chris/Marcel: There are a few edits to the refere...

12/29/2010 12:02:10 PM

From: Carrie Traver/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA
Date: 12/29/2010 12:02 PM
Subject: Appendices

Chris/Marcel:

There are a few edits to the references in the Appendices based on the Reference Additions list and discussions with Greg, Lou, Dave, etc. I also changed any minor typos if I noticed them. (I can't help myself.)

I am sending in 2 separate e-mails due to the size.

Thanks!
Carrie

[attachment "Appendices 1-2.ZIP" deleted by Carrie Traver/R3/USEPA/US]

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Christopher Hunter

Based on comments received, Appendices 1 an...

12/28/2010 02:53:10 PM

From: Christopher Hunter/DC/USEPA/US
To: Carrie Traver/R3/USEPA/US@EPA
Cc: Regina Poeske/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/28/2010 02:53 PM
Subject: Re: Fw: Golden algae and Spruce - References and data

Based on comments received, Appendices 1 and 2 in the FD have been reordered from the RD. Appendix 1 will be "Water Quality & Wildlife" and Appendix 2 will be "Macroinvertebrates"

Aside from that, feel free to edit a copy of the FD and appendices in redline and send them to me.

Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Carrie Traver

Ok. We'll do that. Also, I've been skimming thro...

12/28/2010 02:43:25 PM

From: Carrie Traver/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Regina Poeske/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/28/2010 02:43 PM
Subject: Re: Fw: Golden algae and Spruce - References and data

Ok. We'll do that.

Also, I've been skimming through the FD Draft materials, and have noticed some inconsistencies regarding some of the reference citations with the list, along with a few other minor things (e.g. Appendix 1 is titled Appendix 2.)

Since we don't have much time, what is the best way to handle that? Would it be best to send a list to you...or to add comments to the FD and appendices?

Thanks,
Carrie

Carrie Traver
USEPA Region 3
Office of Environmental Programs
1650 Arch Street - 3EA30
Philadelphia, PA 19103
215-814-2772
traver.carrie@epa.gov

Frank Borsuk/R3/USEPA/US

12/30/2010 11:24 AM

To Margaret Passmore

cc Greg Pond, Jennifer Fulton, John Forren, Louis Reynolds,
Matthew Klasen, Stefania Shamet

bcc

Subject Re: Frank's comments

I tracked these changes but I am forwarding to all.

Frank



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Compiled H&W RD Comments 1-242_FAB.docx

Frank Borsuk, Ph.D.

Aquatic/Fisheries Biologist

Freshwater Biology Team

USEPA-Region 3 (Wheeling Office)

Office of Monitoring & Assessment (3EA50)

Environmental Assessment & Innovation Division

1060 Chapline Street, Suite 303

Wheeling, WV 26003-2995

304-234-0241 Phone

304-234-0260 Fax

borsuk.frank@epa.gov

Please visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Margaret Passmore Stef,

12/30/2010 10:52:09 AM

From: Margaret Passmore/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Cc: John Forren/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Jennifer Fulton/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA
Date: 12/30/2010 10:52 AM
Subject: my comments on Stef's answers

Stef,

only had a few comments on what you sent this am.[attachment "Hunton-Williams Comments_69-242_SS_MP_123010.docx" deleted by Frank Borsuk/R3/USEPA/US]

Matthew
Klasen/DC/USEPA/US
12/30/2010 04:12 PM

To Christopher Hunter
cc
bcc
Subject Re: The latest and greatest draft

Here are my few thoughts (sorry, forgot to send till now). Mostly just adding more highlighting in sections that are likely to change.

mk

ATTACHMENT REDACTED - DELIBERATIVE



Spruce FD 123010 clean draft - mk.doc

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher Hunter	This incorporates all comments I've received so...	12/30/2010 11:12:06 AM
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From: Christopher Hunter/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/30/2010 11:12 AM
Subject: The latest and greatest draft

This incorporates all comments I've received so far and has been scrubbed several times. (b) (5)

[REDACTED]

Chris
[attachment "Spruce FD 123010 clean draft.doc" deleted by Matthew Klasen/DC/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Ann Williams
(b)(6) Ann Williams
12/30/2010 06:04 PM

To Christopher Hunter
cc Ann Williams, Palmer Hough
bcc
Subject Re: Revised Spruce FD

Hi Chris,
Thanks for keeping me posted. (b) (5)

(b) (5)

I'm at (b) (5)
Ann

On Thu, Dec 30, 2010 at 5:15 PM, <Hunter.Christopher@epamail.epa.gov> wrote:
Happy New Year, Ann.

(b) (5)

The new language is below. You'll definitely be on our distribution list for the final document, and once again, thanks for the help.

Chris

(b) (5)

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[REDACTED]

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[Redacted]

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| Ann Williams (b) (6) Ann Williams
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| Christopher Hunter/DC/USEPA/US@EPA
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| Ann Williams/R1/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
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|Re: Revised Spruce FD

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Hi Chris and Palmer,

(b) (5)

Take care, and keep me posted.

Ann

On Wed, Dec 29, 2010 at 11:15 AM, <Hunter.Christopher@epamail.epa.gov>

wrote:

Many thanks, Ann. (b) (5)

Thanks again for your help. Hope you got dug out without too much back strain.

Chris Hunter

U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed

(202) 566-1454

hunter.christopher@epa.gov

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| Ann Williams (b) (6) Ann Williams
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| Christopher Hunter/DC/USEPA/US@EPA
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| Ann Williams/R1/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
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| 12/28/2010 09:57 PM
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Subject: |
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|Re: Revised Spruce FD

First, I just want to reiterate that this draft is greatly improved and looks very good. I've made some specific comments on the document, but here are some general comments.

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[REDACTED]

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[REDACTED]

[REDACTED]

(b) (5)


(b) (5)

A large rectangular area of the document is completely redacted with black ink. It covers approximately the top third of the page.

OK, that's it. I hope my remaining comments on the attached are helpful.
Ann

On Thu, Dec 23, 2010 at 12:34 PM, <Hunter.Christopher@epamail.epa.gov> wrote:

Hi Ann,
I hope you're enjoying the holiday season (I say as I ask for work help). Palmer and I really appreciated the comments you provided us on the draft Spruce 404c Final Determination, they were very insightful and helpful.

A large rectangular area of the document is completely redacted with black ink. It covers approximately the bottom two-thirds of the page, starting from the word 'helpful'.

(b) (5)

If you have a few minutes and would be willing to look at the new version, it would be great to hear about that comment, or any other concerns you'd like to flag. Thanks again and happy holidays!

Chris

(See attached file: Spruce FD 122210 draft.doc)

Chris Hunter

U.S. Environmental Protection Agency

Office of Wetlands, Oceans, & Watershed

(202) 566-1454

hunter.christopher@epa.gov

[attachment "Spruce FD 122210 draft(2)(AW edits).doc" deleted by Christopher Hunter/DC/USEPA/US]

Palmer Hough/DC/USEPA/US

To "Chris Hunter"

12/30/2010 08:09 PM

cc

bcc

Subject Fw: Revised Spruce FD

Chris

Ann has made some excellent points here (b) (5)

Palmer

Sent from my BlackBerry Wireless Device

Palmer Hough, Environmental Scientist
Wetlands Division
U.S. EPA, Headquarters
tel: 202.566.1374

From: Ann Williams (b) (6) Ann Williams

Sent: 12/30/2010 06:04 PM EST

To: Christopher Hunter

Cc: Ann Williams; Palmer Hough

Subject: Re: Revised Spruce FD

Hi Chris,

Thanks for keeping me posted. (b) (5)

I'm at (b) (6)

Ann

On Thu, Dec 30, 2010 at 5:15 PM, <Hunter.Christopher@epamail.epa.gov> wrote:

Happy New Year, Ann.

(b) (5)

The new language is below. You'll definitely be on our distribution list for the final document, and once again, thanks for the help.

Chris

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|Ann Williams/R1/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA

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|12/29/2010 09:01 PM

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|Re: Revised Spruce FD

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Hi Chris and Palmer,

(b) (5)

Take care, and keep me posted.

Ann

On Wed, Dec 29, 2010 at 11:15 AM, <Hunter.Christopher@epamail.epa.gov>
wrote:

Many thanks, Ann. (b) (5)

(b) (5)

[Redacted]

Thanks again for your help. Hope you got dug out without too much back strain.

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

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|Ann Williams (b) (6) Ann Williams
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|12/28/2010 09:57 PM

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|Re: Revised Spruce FD

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Dear Chris and Palmer,

First, I just want to reiterate that this draft is greatly improved
and
looks very good. I've made some specific comments on the document,

but
here are some general comments.

(b) (5)



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[REDACTED]

OK, that's it. I hope my remaining comments on the attached are helpful.
Ann

On Thu, Dec 23, 2010 at 12:34 PM, <Hunter.Christopher@epamail.epa.gov> wrote:

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If you have a few minutes and would be willing to look at the new version, it would be great to hear about that comment, or any other concerns you'd like to flag. Thanks again and happy holidays!

Chris

(See attached file: Spruce FD 122210 draft.doc)

Chris Hunter

U.S. Environmental Protection Agency

Office of Wetlands, Oceans, & Watershed

(202) 566-1454

hunter.christopher@epa.gov

[attachment "Spruce FD 122210 draft(2)(AW edits).doc" deleted by Christopher Hunter/DC/USEPA/US]

**Margaret
Passmore/R3/USEPA/US**
12/31/2010 07:18 AM

To Matthew Klasen, Stefania Shamet
cc John Forren, Greg Pond
bcc
Subject comments on 12/29 draft thru 173A

Matt,

I know this is less than ideal, but thought you might want my comments to date.

Here are comments thru 173A.

I will work on editing the rest of our technical comments today.

I have not checked all our cross references to other PD and RD responses to make sure they make sense and are complete. That will be the last thing I get to. I may have Jen help me with that Monday.

Maggie



ATTACHMENT REDACTED - DELIBERATIVE

2010-12-29 Compiled HW RD Comments 1-242_MP_123010_thru 173A.docx

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at <http://epa.gov/reg3esd1/3ea50.htm>

Jim
Pendergast/DC/USEPA/US
12/31/2010 07:18 PM

To: Tom Wall
cc
bcc
Subject: Fw: Dec. 30 Working Draft of Spruce FD for
Review/Comment

-----Forwarded by Jim Pendergast/DC/USEPA/US on 12/31/2010 07:17PM

To: Peter Silva/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Mike
Shapiro/DC/USEPA/US@EPA
From: Christopher Hunter/DC/USEPA/US
Date: 12/30/2010 05:10PM
Cc: Bob Sussman/DC/USEPA/US@EPA, Steven Neugeboren/DC/USEPA/US@EPA, Denise
Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Brian
Frazer/DC/USEPA/US@EPA, Avi Garbow/DC/USEPA/US@EPA, Arvin
Ganesan/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Palmer
Hough/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Julia
McCarthy/R8/USEPA/US@EPA, Jordan Dorfman/DC/USEPA/US@EPA, Ann
Campbell/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Shawn
Garvin/R3/USEPA/US@EPA, William Early/R3/USEPA/US, John
Pomponio/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Kevin
Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, David
Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
Subject: Dec. 30 Working Draft of Spruce FD for Review/Comment

Pete, Nancy, and Mike,

per Dave Evan's email last week, we are sending you the currently working draft of the
Spruce No. 1 Mine Final Determination for your review. It reflects all available comments
received and is nearing final draft status, with the exception of new material being
generated in response to comments received on the Region's Recommended Determination.
If you have any comments before the briefing scheduled Tuesday at 9:30am, please
respond to me and I will incorporate them. Our current schedule is to accept final comments
no later than January 7, 2011 in order to prepare the final version by January 10.

(See attached file: Spruce FD 123010 clean draft.doc)

Happy New Year and thanks again to everyone who has contributed to this effort.
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov



- Spruce FD 123010 clean draft.doc

ATTACHMENT REDACTED - DELIBERATIVE